electrical contracting

With which is consolidated The Electragist and Electrical Record
Established 1901

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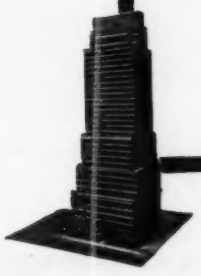

A SERVICE PAPER for electrical contractors, engineers, motor shops, industrial electricians and inspectors, covering engineering, installation, repairing, maintenance and management, in the field of electrical construction—industrial, commercial, and residential.

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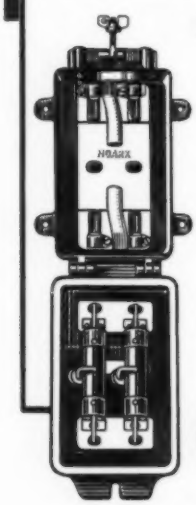

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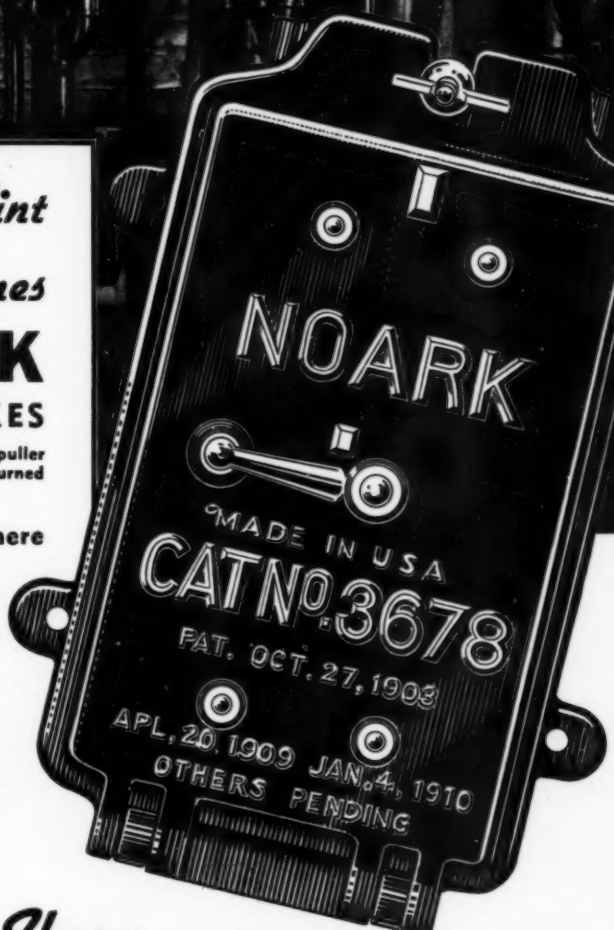

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SWITCHES INDUSTRIAL CONTROL EQUIPMENT FUSES

Boston
New York
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DECEMBER, 1938

Now Ask 'Em!

ONE LONG AFTERNOON we labored on a committee setting up a program for a sales conference. Over an hour we discussed how to approach a certain top man of industry. We wanted him to speak. It would take strategy to get him.

IN WALKED BILL HILL, a salesman, and we asked his advice. "Hell!" he exclaimed. "This big guy is only a man. Why don't you *ask* him?" So, we saddled the job on Hill, and the guy said—"Yes."—and that was that.

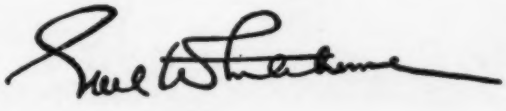
WELL, WE NEED A LOT OF BILL HILLS in this business right now to cash in on an immediate opportunity. For we've had an election. And no matter what your politics may be, this fact stands forth—*The power of the New Deal to blight the courage of American business is definitely curbed. The prospect of national bankruptcy is removed. The end of business baiting is in sight. The swing back to sanity is on.*

ALLAH BE PRAISED! Management can now make plans. It need not wait to see what Congress does. It is enough to know that two-party government has returned to Washington. The time has come to shout—"Hot Damn!" and step right out.

AND WHERE SHOULD WE STEP?—Ha! That's just what I wanted you to ask. Let's step first to our best prospects—the people we know. Let's go help those customers of ours who ought to modernize their use of electrical equipment—to improve working conditions or to cut costs or to increase production.

IT'S SUCH A SIMPLE THING TO DO! Go dig out every proposal that has died of chills and fever in the last four years. Go sell it again! Make more system surveys for other customers. Show them too, what they need.

BUSINESS IS NOW ON THE MOVE. All the signs are pointing up. You can stop worrying about how to get an order. Go ask for it. Crystallize the growing confidence of management into this kind of action. You owe it to your customers. And surely you owe it to yourself.



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ADEQUATE WIRING *benefits all! . . . We offer this cooperation*

The combined efforts of the entire electrical industry are already bringing in new Adequate Wiring business to electrical contractors.

We're glad you electrical contractors are getting this business. We want you to get more of it and will be glad to work with you on your selling and promotional plans.

Graybar backs the cause of Adequate Wiring not only with its own promotional efforts, but also by providing a convenient source of electrical supplies for contractors everywhere. You'll find *adequate stocks* for *Adequate Wiring* at your nearby Graybar warehouse.

And you'll get *action service* . . . either in the form of speedy delivery . . . or at handy service counters. Make Graybar your Adequate Wiring supplies headquarters.

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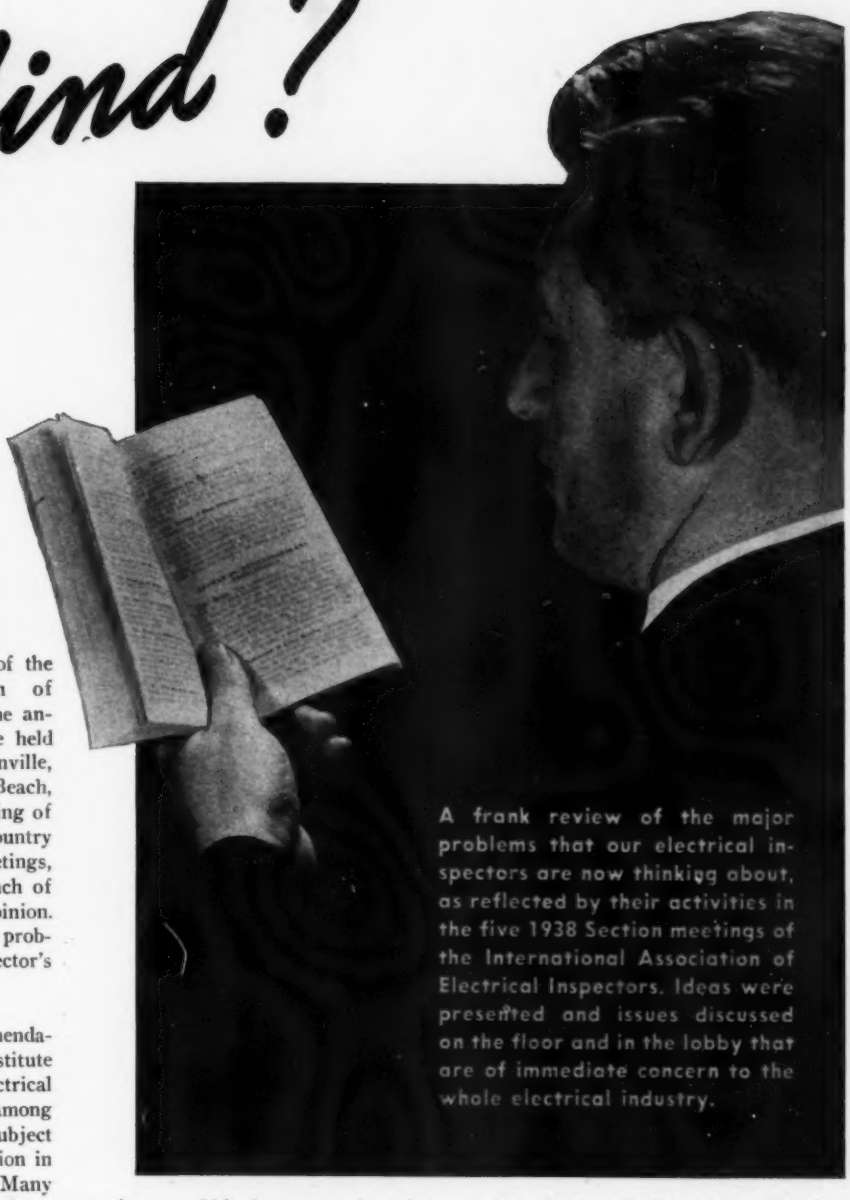
What's on the Inspector's *Mind?*



A frank review of the major problems that our electrical inspectors are now thinking about, as reflected by their activities in the five 1938 Section meetings of the International Association of Electrical Inspectors. Ideas were presented and issues discussed on the floor and in the lobby that are of immediate concern to the whole electrical industry.

ANALYZING the activities of the International Association of Electrical Inspectors in the annual section meetings which were held this year in Baltimore, Jacksonville, Cleveland, Spokane and Long Beach, certain definite trends in the thinking of the electrical inspectors of the country become apparent. At these meetings, the leaders of the inspection branch of our industry have crystalized opinion. Out of it all we see nine major problems now on the electrical inspector's mind—

1. *E.E.I. Proposals*—The recommendations of the Edison Electric Institute for revisions to the National Electrical Code are being widely discussed among the inspectors. However, the subject came up for open meeting discussion in only two of the section meetings. Many inspectors look upon these proposals as an attempt to break down the safety standards of the National Electrical Code. First submitted to the National Electrical Manufacturers Association and then to the Electrical Committee of NFPA, they were not formally submitted to IAEI. Consequently, many inspectors felt that formal discussion of these proposals in this year's section meetings would be improper, since those which survive Article Committee action will be formally presented next year during the Article Committee reports.

2. *Receptacle Spacing*—Another item of major importance to the inspectors was the industry experience with Article 2110 of the National Electrical Code during the past year. This article requires the installation of enough plug receptacle outlets in residential occupancies so that no point on the walls of principal rooms shall be at a distance greater than 10 feet from a plug receptacle outlet.

Public reaction to this rule, especially in the rural districts, has made it one of the most important enforcement problems facing the inspector since the

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adoption of the 1937 Code. In one meeting, to the questions of how many had found difficulty in enforcing this rule, a show of hands indicated that more than half of the inspectors present had found it a problem in their communities. Strangely, much of the criticism of this rule has come from electrical contractors.

In farm communities the problem is particularly acute. Many farm homes are being wired under the REA program for the first time. These farm homes were constructed in the days when large rooms were common and farm homes frequently included ten to sixteen rooms. Because much of this space is today unused many farmers object to the expense of including wiring for these rooms on the same basis as occupied quarters.

In the state of Michigan, for instance, Article 2110 was withdrawn and a supplementary rule adopted, permitting a minimum number of plug receptacles for each room regardless of size. Yet, in spite of these difficulties electrical inspectors are practically unanimous in the opinion that this rule is a step forward in the interest of safety. That some modification of this rule may be desirable, to avoid many instances of unjustified expense to the home owner, is generally conceded. Yet inspectors feel that there should be no reduction of these standards in the National Electrical Code.

3. *Inspector's Guide*—The publication of an Inspector's Guide by the IAEI was proposed and hailed as an aid for the inspector which is greatly needed. This guide would contain information for use in making inspections, reporting inspections, answering problems of interpretation, and dealing with the electrical industry and the public.

4. *Uniform Ordinance*—In the interest of standardization, a committee of inspectors is working with other branches of the electrical industry toward setting up a uniform electrical ordinance for the use of municipalities. Many communities are operating under antiquated electrical ordinances or none at all and such a uniform ordinance would make available the best experience of the industry to communities who wish to adopt modern electrical regulations.

5. *Rural Inspection*—The tremendous growth in rural wiring during the past few years has presented a big inspection problem and today 43 of the 48 states have some facilities for rural inspection. This program has greatly increased the number of inspectors necessary to safeguard the public from defective wiring. Rural inspections have also raised many wiring problems that have heretofore received little consideration. Consequently, inspectors want the development of Code rules to protect the farmer, who is far removed from the fire fighting facilities of urban communities.

Electrical inspector organizations in each state are working closely with those responsible for setting up inspection programs in rural line projects. Through these efforts special rules applying to farm properties have been established and enforced by REA regulations, and certification plans, examinations and other devices have been set up to insure competent inspection.

PROTECTION—*Rules safeguard progress as well as crystalize experience.*

6. *Contractor Licensing*—With regard to state legislation providing state-wide electrical inspection, present laws, generally, combine mandatory inspection with some form of contractor licensing. Opinion among the inspectors is divided on this problem. However, the majority feel that combining contractor licensing with state-wide inspection has hampered the adoption of inspection laws in many states. In the practical political job of promoting state legislation, the inspector usually finds himself backed by several powerful interests. These same interests, however, frequently look with suspicion upon projects for licensing the electrical contracting industry. Experience in states with contractor licensing, however, has shown the inspector to be very favorable toward a contractor license or registration device as an adjunct to state-wide inspection legislation.

7. *Trial Installations*—Special permission by local inspection departments for trial installations of new types of wiring materials is generally frowned upon. Such a program places an unjustified burden of responsibility upon the local inspector and establishes loopholes of precedent which hamper the rigorous enforcement of other provisions of the National Electrical Code. The problem of "special permission" has always been a difficult one for the local inspector and the trend of thinking favors the elimination of this phrase from the National Electrical Code. The right to grant special permission is frequently embarrassing to the local inspector and he would prefer to have this right removed from the Code.

8. *Shock Hazard*—A trend toward expanding the text of the National Electrical Code, to cover more provisions for safety from shock hazards, is gaining momentum from the demands of electrical inspectors. More adequate and interconnected grounds on wiring systems are demanded. The grounding of portable tools and appliances is receiving much consideration.

9. *Adequacy*—Many inspectors are promoting the idea of more rules for safety, based upon the adequacy of wiring installations, for example, Article 2110, making the number of plug receptacles dependent upon the wall perimeter. In calculating the mains for residential wiring, they are proposing that 2000 watts be allowed for small appliances, that 2 watts per sq.ft. be used in calculating loads, that No. 6 services be the minimum.

In this, they are looking at the history of electrical wiring installations over the past 30 years and the methods home owners have adopted to serve new appliances. Experience has shown only adequacy provisions in the initial installation can eliminate hazardous practices by the householder after the wiring system is beyond the jurisdiction of the inspection department.

10. *Vital Cooperation*—Inspectors are asking for better cooperation from the electrical contracting industry, that there may be fewer minimum standard jobs. They are asking of the legislators, better electrical laws, fewer special local regulations. Of themselves, they are demanding uniform interpretation and more methodical inspection. They ask the public to look to the past as a guide, that the safety of the future may be provided for. They appeal to all for a more thoughtful appreciation of what the electrical inspector is trying to do.

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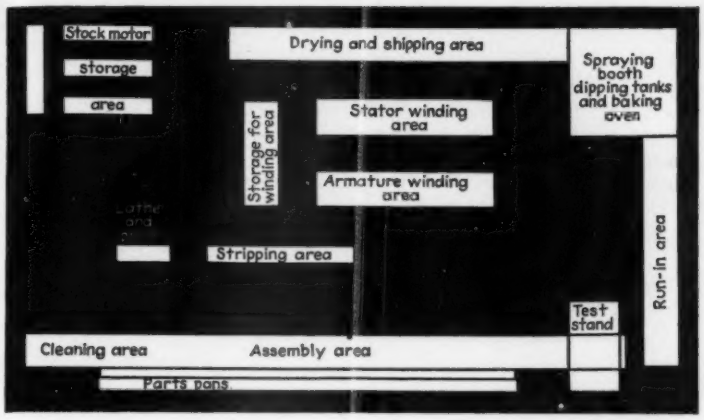
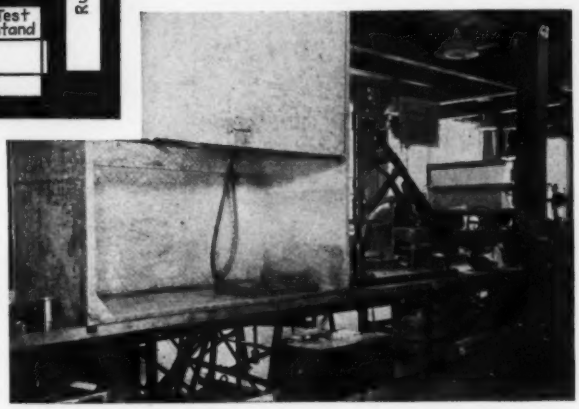


STEPS SAVED—*A suggested shop layout for handling small motor repairs on a production basis.*



WORK FLOW *along steel-clad benches saves steps, stooping and handling. A partial view of the small motor line at the H. N. Crowder, Jr., Co., of Easton, Pa.*

A Layout for Small Motor Repairs

By
Howard T. Rosquist

THE increasing number of household appliances which use fractional horsepower motors places increased demands upon established repair shops to give owners, contractors and servicemen twenty-four hour motor service. But because of the small price difference between new and re-built motors, most shops are reluctant to take in small motors. Therefore, it is necessary for shop owners to set up a special department for fractional horsepower motor production, employing mass production methods.

Shop owners in organizing this department must re-educate certain employees, increase output, decrease expense and maintain such standards of workmanship that a motor can be safely guaranteed for one year. "Comeback" motors which must be repaired free of charge, cut deeply into shop expense.

For high speed mass production methods the ideal shop layout provides:

1.—Work flow in a straight line or sequence of operations.
2.—Walking distances made as short as possible.
3.—Assembly benches built long, to accommodate working on a large number of motors in chronological order.
4.—Cutting down unnecessary handling.
5.—Height of benches made 40% of the height of the worker, or so the knuckles of the worker just touch the bench. Stooping produces more fatigue than both walking and standing combined.
6.—Bench tops made of sheet steel to allow free motion in sliding pans and motors.
7.—Locate test stand or prony at far end of assembly bench so all motors may be assembled before tests of torque and speed are made.
8.—Provide racks above assembly bench at arms length for parts, graded in the order of their importance of use. Rapid selection of parts saves unnecessary steps.
9.—Locate the lathe in the rear of assembly bench for accessibility to cleaning department. While motors are being torn down and preliminary tests made, armatures and commutators can be trued up, parts cleaned and replacements completed.

Simplified records of motor repairs take care of individual guarantees and permit the accounting department to charge the parts used. A numbered job card is issued and remains with the motor through the departments. The card number is stamped on the repaired motor as a guarantee number.

After incoming motors are recorded, tested and sent to the cleaning department, they are torn down and the needed parts recorded on the job card. The repairs are listed as minor, major (armature or stator), or complete rewind. Armatures, field coils and stators are exchanged with the winding departments, and recorded on the job card.

Completed motors are tested, stamped with their guarantee number and placed on the run-in bench. Thorough motor tests eliminate any noise or other fault that might cause it to be returned.

Motors go from test into the spray room and are sprayed with lacquer to a high finish. The drying bench is a continuation of the shipping bench.

Costs can be reduced by buying parts in large quantities and by buying job lots of used motors that can be used for parts or rewound for exchange service. Such salvage parts as bolts, brush holders, counter weights will effectively cut down expense. The stock exchange service reduces pressure on the winding and production departments during rush season, because stock motors can be repaired and rebuilt during slack seasons. In this manner, with line production, elimination of unnecessary steps, and by making every minute productive without sacrificing quality, small motor work can be handled efficiently.

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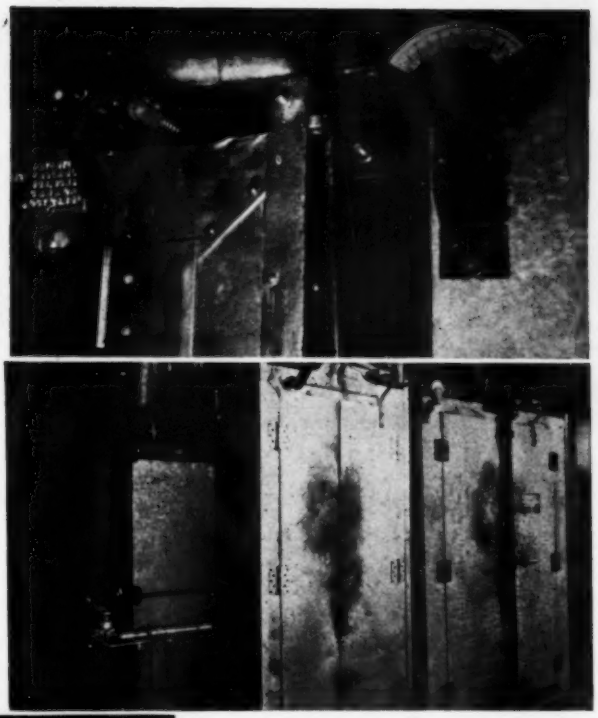
MAKING DUAL OVENS AUTOMATIC

A centrally heated oven installation which provides worthwhile control features.



HEAT SENTINELS—*Separate indicating thermometers on each oven (top) provide a visual check of each oven's performance. Heat-shut-off door switch at left of thermometer operates damper solenoids when oven door is opened.*

DUAL OVENS *employing a single heating unit (above) have forced air circulation and automatic controls for independent operation.*

INDIVIDUAL CONTROLS *(left) for each oven include a thermostatic mercury switch, and a "hand" or "automatic" transfer switch for direct or automatic heat control.*

TWO ovens heated from one gas-fired automatically controlled heating unit provide flexibility and more efficient operation in the Electrical Installation Company's service shop at Cambridge, Mass. A small oven is operated at low temperatures for drying and setting compound. The larger oven takes care of regular bake jobs that require around 250 deg. F. temperature. The small oven is also available for handling small bake jobs at higher or special temperatures to save operating the larger oven.

As an evidence of the versatility of the ovens, here are some of the routine baking jobs done in this shop's large industrial service business—

1—Preheating rewound armatures and stators to remove moisture and to provide better varnish impregnation.

2—Baking regular types of varnish-impregnated windings.

3—Setting compound applied to impregnated windings.

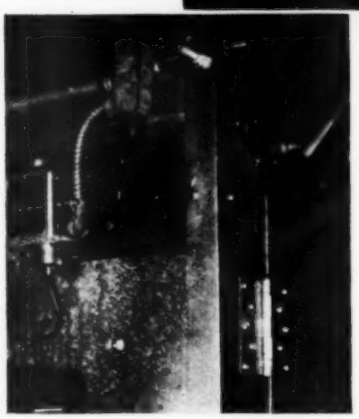
4—Baking water or oil-soaked apparatus before re-insulating the windings.

5—Drying heavy metal parts after cleaning with solvent, for application of enamel finish.

6—Special baking jobs on small coils.

7—Long-run bake jobs on large coil masses to cure deep penetrations of varnish.

Some of the more interesting features of this unusual installation are—



1—Independently regulated oven temperatures, though heat is from one central unit.

2—Evenly diffused oven heat by forced air circulation.

3—Automatic control of gas burners under the boiler.

4—Door-operated duct control permitting opening of ovens without annoyance from hot air blasts.

5—Damper adjustments to provide forced up-draft ventilation to carry away harmful solvent fumes.

The equipment now consists of:—

Oven No. 1, 70 in. wide, 73 in. deep and 82 in. high (inside dimensions).

Oven No. 2, 42 in. wide, 48 in. deep and 82 in. high.

Gas-fired tubular boiler using air circulation through tubes instead of water.

Automatically controlled blower and motor with a system of air circulating ducts.

Solenoid gas valve.

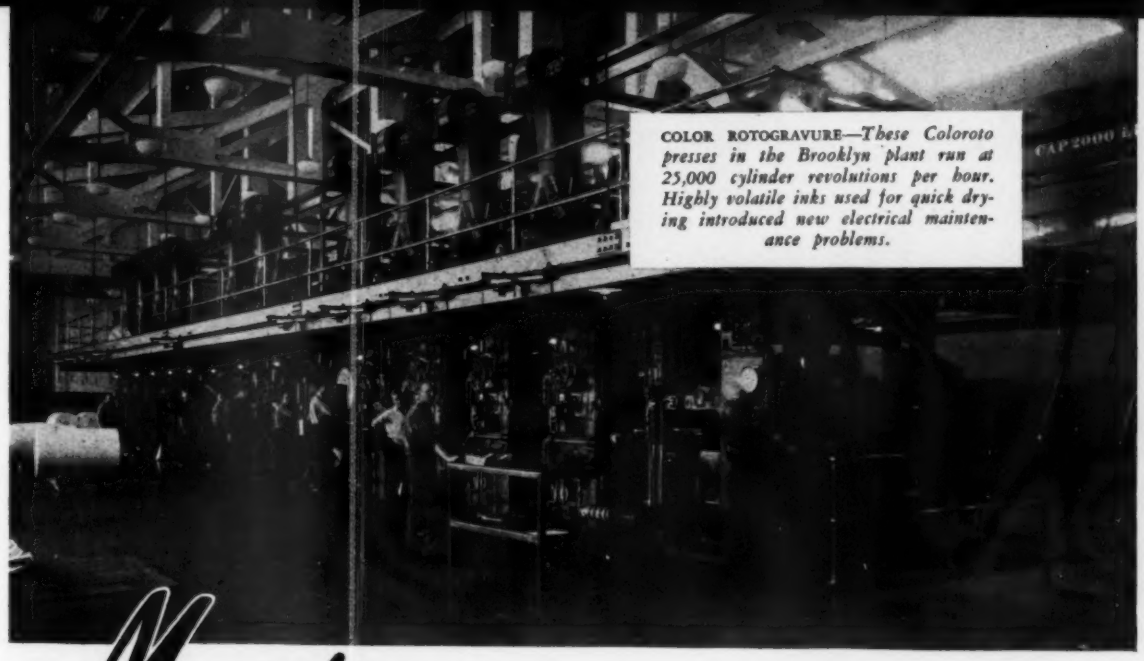
Solenoid-operated butterfly dampers in ducts.

Thermostatic mercury switches.

Relays, auxiliary switches and time switch.

Both ovens require their own heat controlled through independently operated and adjustable thermostatic mercury tube switches. These switches actuate their corresponding relays which in turn—(1) open solenoid-operated butterfly valves in the heat intake duct and return air ducts supplying that oven. Or (2) if the heating system is not running, the blower motor starts, and (3) the gas valve is opened. The

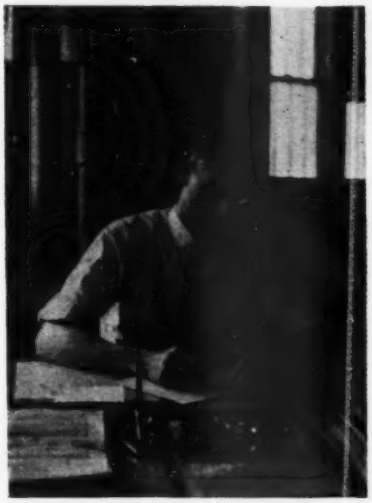
(Continued on page 39)



COLOR ROTOGRAVURE—*These Coloroto presses in the Brooklyn plant run at 25,000 cylinder revolutions per hour. Highly volatile inks used for quick drying introduced new electrical maintenance problems.*

Maintaining A Big City News Plant

In a 365-day race to deliver last-minute news to 10 million people, fast schedules are commonplace, delays a calamity. After 13 years of it, the man responsible for the electrical maintenance tells how it's done.



By John Peters
Chief Electrician
Daily News, New York

ELECTRICAL maintenance is high-geared routine in the *Daily News* plants. Here 1,750,000 copies of the weekday papers and 3,150,000 copies of the Sunday edition are produced. Back of the exacting deadlines and coordination that guides linotypists, photo engravers, pressroom workers and others, looms always the threat of mechanical delay or breakdown. And when an important edition is late on the streets there's Hell to pay. Somebody must explain just what happened and why it was not prevented.

Because there is so much at stake, the electrical department of the *Daily News* is operated on a basis of a 24-hour, 365 days-per-year vigil for trouble prevention. Delays from electrical causes are demerit marks for the electrical department until good evidence is produced to the contrary.

Management being fair minded and also keenly appreciative of proper electrical maintenance, it has been possible to develop a system that has removed much of the mystery from newspaper plant electrical troubles. Electricians take the rap when it is their due. But a system of synchronized production and inspection charts, exacting reports of trouble calls, and records of maintenance operations permit higher-ups to get facts quickly. These facts become permanent records from which to ana-

DAYSIDE WORKERS *must clean, adjust or replace thousands of contacts at motors, relays and terminals at 21 huge presses every day. Its trouble prevention for busy night runs.*

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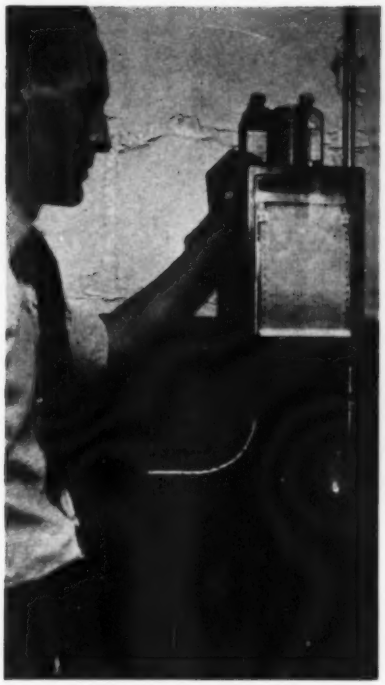

TROUBLE-PREVENTER *John Peters, chief electrician of the two* NEWS *plants and three other buildings, weathers a maze of fast-moving storms by an alibi-proof system of control*

STOPPAGE RECORDERS—*A bank of electrically actuated tachometers which print charts giving separate press speeds and indicate any stops made during a run.*

lyse recurrent troubles and to map important corrective recommendations.

Briefly the maintenance system is dovetailed with electric tachometer charts that record the performance of all presses. Electricians make separate written reports of all trouble calls and repairs. They also write up a report of their daily maintenance work, and note thereon any doubtful or faulty symptoms which need attention. Verbal reports don't go. Fifteen important areas or stations are patrolled by electrical inspectors, some every hour. A separate recorder in the electrical department prints a chart of the exact time such inspections were made. Each of the three 8-hour shifts prepares in writing important information that must tally with the separate chart records.

There are *Daily News* plants in Manhattan and Brooklyn and each operates 700 motors. A crew of 24 union men makes up the electrical force, whose work, in order of importance, covers: inspections and maintenance of control equipment, motors, lighting equipment, signals and heating elements. The main departments in these plants are: press room, composing room, photo engraving, stereotype, mailing and delivery and paper storage.

To keep tab on what happens in these two plants, and also to have every electrical man work to best advantage, there is a system covered by this set of working rules—

1. All instructions and assignments are in writing and in duplicate. One copy is signed for, or the reply written thereon and signed.
2. Every man has a definite typewritten list of equipment or departments for which he is responsible.
3. Exact schedules of inspection and maintenance are set for all equipment and are worked out to coincide with the tricks assigned to various men.
4. Separate work orders must be made out giving full details, for every trouble call, all repair work, and all maintenance operations.
5. Men leaving their shifts must report all uncompleted or temporary repairs to oncoming shifts.
6. Written reports are required for failure to make a scheduled inspection.
7. Night men may do anything that is necessary to keep the plant running, while the day shifts must make permanent repairs.
8. Each man receives a book of detail drawings applying to all special controls under his care.

Some of the plant routine requires extreme skill and cool headedness, to check delicate tension adjustments, controller functions, paster trouble and the many other intricacies of newspaper plant electrical equipment. With presses travelling at a web speed of 1633 ft. per minute, we print about 50,000 papers per hour, from each press and require a new roll of paper every 18.3 minutes in each reel. The peak of pressroom activity is from 8 p.m. to 6 a.m., a time of night when there is little help to be had by trouble-stumped

CHORES in NEWSPAPER PLANT MAINTENANCE

Examples selected from a list of 704 motors in the Brooklyn Plant

1. Equipment is inspected daily, cleaned and oiled each week, some motors oiled daily.
2. Cleaning includes scraping commutators, repairing and replacing contacts, checking and cleaning motor brushes, button stations, limit switches, paper break detectors.
3. All speed presses tested daily. After testing, the men do what cleaning and repairing is needed.
4. One day each week, inspections are made of all electrical equipment in the garage.
5. Motors and other equipment are segregated as follows—

GARAGE — 44 motors and controllers.
DELIVERY ROOM — 11 motors for bundle tying, paper drop, conveyors and heaters.
OLD GARAGE — 7 motors for ink laboratory, heaters, door openers, solvent pumps.
SLOW BLACK PRESS, REEL ROOM — 54 motors for press drives, reel rotation, tension, margin. Control stations.
BLACK SPEED PRESS, REEL ROOM — 133 motors for drives, reels, pasters, tension and sheet busters. 176 reel limit switches. Press and tension control stations, tiering machine, paster and reel controls, press lights and signals.
COLOR PRESS REEL ROOM — 22 motors for drives, vacuum system, chain oil pumps, margin, reels, paster and paster booster.
BLACK PRESS ROOM — 27 motors for fans, plate and clean out conveyors, tachometers, machine shop and paper drops, button stations, signals, paper break detectors, clocks, lights.
BLACK PRESS CONTROL GALLERY — 27 motors for fans, m-g sets, pilot motors, drills and grinders.
OTHER FLOORS — 291 motors for pumps, fans, elevators, conveyors, converters, compressors, etc.

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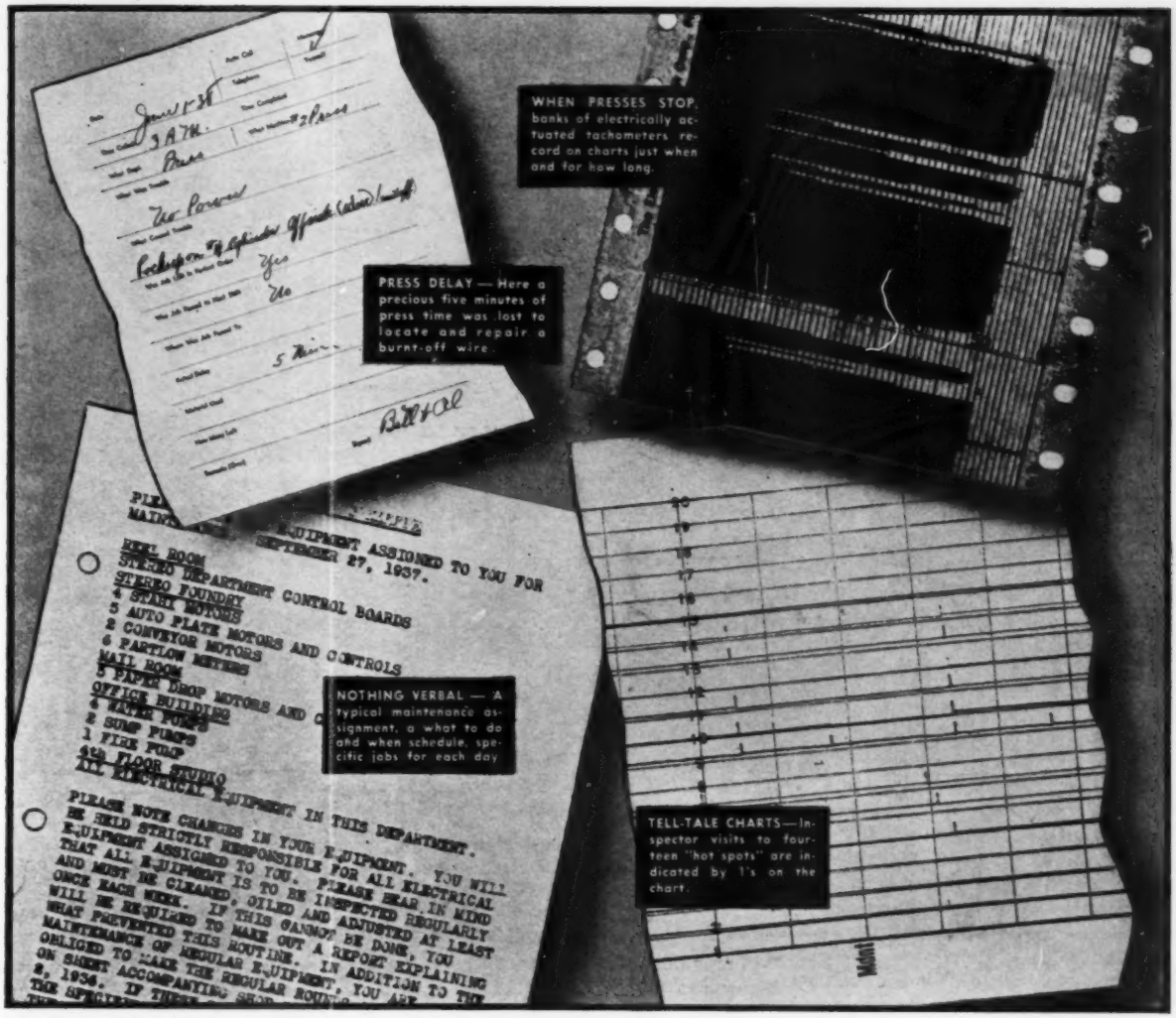
WHEN PRESSES STOP, banks of electrically actuated tachometers record on charts just when and for how long.
PRESS DELAY — Here a precious five minutes of press time was lost to locate and repair a burnt-off wire.
NOTHING VERBAL — A typical maintenance assignment, a what to do and when schedule, specific jobs for each day
TELL-TALE CHARTS—Inspector visits to fourteen "hot spots" are indicated by 1's on the chart.

electricians, from the outside world.

Therefore it is up to maintenance men to prevent night-time tragedies by careful day-time scrutiny. Thousands of contacts are checked every day, on the rows of press control devices. Motors are cleaned and oiled. Insulation is tested. Other equipment gets similar careful going over while idle, but at varying periods according to its use and abuse.

Getting men to do these jobs right is another long story. Generally they come up in their work from a start on construction. New men are always broken in alongside older men. Here they can be observed as to their competency, temperament, natural ability and aptitude for "smelling" sources of trouble. Men who go to pieces in emergencies are hopeless for our maintenance work. It takes the qualified and already experienced electrical worker at least six months to gain confidence in himself on these midnight tests of trouble prevention.

Back of all these jobs are definite rules and records that support the men. The Manhattan office has its master records of all *Daily News* equipment, detail drawings, work schedules and chart records. It may seem a tedious task to keep this daily flood of reports in order, to check so much detail and to record it. But experience has proven its value in many ways. Many facts come to light about causes of trouble and frequency of interruptions. It all has a place in maintaining a swift pace in producing a metropolitan newspaper.

HOURLY VIGIL — *Every hour an eagle-eyed inspector must pass through these rows of press control boards to reach the remote register button and record each visit made to fifteen such "hot spots".*

Mass Production FARM WIRING

By W. T. Stuart

WESTGATE BOSS *Cliff Rice keeps on the move, visiting each of the farm wiring projects once every two weeks.*

Farm wiring is nice work. But getting the jobs and making a profit takes shrewd management and organized selling. This Ohio contractor meets the challenge of amateur competition with big time selling methods and efficient organization.

IN an eighteen month period, recently, the Westgate Electric Company of Columbus, Ohio, installed 2,800 farm wiring jobs. At an average price of $107, that represents a business volume of $300,000, which is definitely out of the pin money class. In recent months the organization has been built up to a 400 jobs per month capacity, a bogey that is expected to be reached before the end of the year.

This outstanding job of farm wiring did not just happen. It is the result of a carefully planned program and an aggressive sales policy. Seventeen years ago Cliff Rice, proprietor of the Westgate Electric Company, started in business as an electrical contractor. Before long, he expanded his business into the merchandising field and took on a line of appliances. Then a radio repair department was added. Today the store, office and supervisory staff numbers 18 employees.

In the early part of 1937 new farm lines were spreading across Ohio. Farms had to be wired to use the new power and Cliff Rice saw another opportunity. This type of work was not new, for Westgate had wired farms and installed farm lighting plants for many years. But this new market was of a different order, offering hundreds of new farm prospects where one existed before. Also, these customers would not be easy to reach for they were spread out over a wide territory. And many were planning to do their own wiring with the aid of farm bureau cooperatives. Handy men and crossroad Edisons were already in the field with mail order materials.

Rice recognized these problems as primarily a challenge to sales ability. The job was, first, to convince the customer that his work should be installed by legitimate electrical contractors. Then it was necessary to sell adequacy and convenience to people who had had no experience with electricity in their homes. Out of the headaches of the first few months of cut and try effort, a "unit plan" was evolved. Sales and installations were separated. Today the Westgate Electric Company is organized to handle up to 400 jobs a month on a profitable basis.

Field activity centers around this "unit plan," which was designed to take care of the extensive areas over which the work had to be handled. When line contracts are let, the area to be served is placed under the jurisdiction of a unit field office. Representatives from Columbus immediately contact the project superintendent and outline to him the facilities for handling the wiring of the project at a low cost basis. The offer of responsible work by a large organization, providing high grade materials and an air-tight guarantee, in most cases convinces him that it is unnecessary to organize a cooperative wiring school or similar amateur competition.

With the cooperation of the project supervisor assured, storage and office facilities are rented or built and a sales crew is organized for that area. The farmers are approached first with a story of electrical comforts and convenience, supported with farm wiring booklets prepared by manufacturers.

When line construction activities start, the interest of the prospect has been developed to a point where contracts may be closed. Standard contract forms are used then by the salesmen and prices quoted from an established set of unit prices. Salesmen have no authority to vary the price structure under any circumstance. Where special jobs are encountered such as local lighting plant changeovers, details of the job are collected by the salesman and submitted to the Columbus office for a special estimate.

In a typical project of 600 potential jobs, Westgate will sell on an average of 300 or 50 per cent of all the wiring on the line. Individual areas will vary widely from that average, however. Some run as low as 20 per cent, others exceed 80 per cent, depending upon the local conditions.

There are two important keys to the friendly local cooperation and the success of the Westgate sales program. The first of these lies in the absence of high pressure sales methods. No attempt is made to get 100 per cent of all of the work from any given line.

Another reason for the friendly local cooperation is reflected by the Westgate policy with respect to appliance sales.

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SALES MEETINGS *are held at least once every two months in Columbus. Unit managers and superintendents gather here to exchange experience and coordinate the activities of the organization.*

HEADQUARTERS—*This attractive store will be replaced by a new building, now under construction, made necessary by the expanding rural wiring business.*

Wiring salesmen instruct the farmers in appliances they should purchase for their homes, but they are referred to local dealers. This builds good will with the small dealers, who have neither the facilities nor the experience to carry on an extensive wiring program. With Westgate handling the wiring jobs these local organizations are free to use their limited staffs for appliance sales, and then pull for Westgate.

Up until four months ago, this same policy was followed on lighting fixtures. Now, due to the fact that jobs were held up, while customers were shopping for fixtures, a direct factory to customer plan of selling lighting fixtures is being worked with success. A new REA plan for selling package fixtures has been set up to facilitate selection.

Under the "unit" system each field office operates as a separate branch. Sales, material orders, estimates, contracts and installations are handled from the field office. Bookkeeping, payrolls and purchases are handled in the Columbus office. Four of these units now operate in the state of Ohio, another in Kentucky. Each unit is responsible for work within its own geographic boundaries. It is in charge of a sales manager and a wiring superintendent, who direct their respective crews which average five salesmen and 20 wiremen.

Salesmen work individually, each man assigned to a territory and responsible for all sales within that area. Wiremen work in two man crews, completing each job with the exception of the service. Service work on all jobs is handled by a special two man crew. One such crew is assigned in each unit. Wiring crews with special training are assigned to all 32 volt changeovers and other jobs of this character. Of the ten crews in each unit two or three are selected to handle these special jobs.

Labor costs present a vital problem faced by contractors who sell wiring in the farm market. The Westgate sales policy is founded upon two important factors peculiar to this type of market. First, local competition in rural areas is usually based upon low wage rates. And while no attempt was made to compete on a strictly price basis, it was necessary to establish unit costs which were within "selling distance" of the prices quoted by local sources. The other factor is the farmers prejudice against the high scale of pay demanded by city workmen.

Salesmen are paid a straight salary, geared to the prevailing compensation for similar work in the communities in which they operate. Wiremen are compensated by a piece work rate which permits the average wiremen to earn wages well above the prevailing compensation for skilled workmanship in rural areas. However, no attempt is made to maintain big city wage standards. Wiremen are recruited as far as possible from rural communities adjacent to the project, with men who are accustomed to working in rural areas and dealing with farmers. Materials used are of top quality, an important point in the sales program.

Wiremen frequently "sell up" the job during the installation. Additional outlets, circuit breakers, additional circuits are billed on the same unit prices as similar work in the original contract. These extras average about 10 per cent of the original contract amount.

Proprietor Cliff Rice and Superintendent Carl Birle maintain close contact with the field work. Each unit is visited personally at least once every two weeks. A mimeographed weekly bulletin provides a clearing house for new ideas from each unit and keeps the field men in touch with new developments in the Columbus office. At least once every two months, managers and superintendents gather at the Columbus office for a sales and installation conference, which provides an open forum for discussing common problems.

The reason for the outstanding success of the Westgate Electric Shop in the farm wiring market can be summed up in three basic points. One—a well planned, aggressive sales policy, separate from the installation department. Two—close and friendly cooperation with other organizations and firms who have an established interest in the communities. Three—a one price, low cost policy based upon a large volume of business with labor rates geared to rural community standards.

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FLUORESCENT TUBES

STORE LIGHTING *needs range from display cases to color matching and decorative schemes. Fluorescents offer a fresh approach.*

Contractors will benefit in all their major markets . . . .

FLUORESCENT LAMPS
A Bit of General Information

COLOR OF EMITTED LIGHT—
Daylight white, warm white, red, pink, gold, green, blue.

SHAPE AND SIZE OF LAMP—
Tubular, 1 in. by 18 in., 1.5 in. by 18 in., 1.5 in. by 24 in., 1 in. by 36 in.

HOW OPERATED—
Choke coil and starting device required for each lamp.
Burns in any position.

LUMENS OUTPUT PER WATT—
White — 30/35, Red — 3, Pink — 20/24, Gold — 18/21, Green — Blue—18/21.

WATTAGE RATINGS—
15-W@ 110-120 V.; 20-W@ 110-120 V.; 30-W@ 230 V.

PERFORMANCE—
Best operating temperature—60 to 80 deg. F.—below or above this range reduces light output. Light output varies two percent with one percent variation in voltage. Nominal lamp life 1000 hours.

NO HEAT—*Many critical industrial tasks need high intensity, but workers suffer from lamp heat where other light sources are used.*

THREE things make fluorescent lighting of vital interest to every contractor. This new illuminant is going places in the commercial, industrial and residential fields. This means wiring jobs. In fact, some predict a revolution in present lighting standards. Here are the chief reasons—

1. More light per watts-input than tungsten—filament lamps.
2. Soft and pleasing artificial daylight and decorative color illumination.
3. Cool light, involving only one fourth the radiant heat of tungsten lighting.

A practical interpretation of these three factors must next be made by the lighting minded contractor. Thus the broad sales possibilities reveal themselves in terms of wiring jobs that go with fluorescent installations.

Commercial applications stand out as the first rich re-lighting market to explore. Here these novel advantages become immediately evident—

1. *Color Appeal* — Merchants can use color effects to show their wares. Possibilities are almost unlimited for show cases, display panels, niches, posters, cove and canopy arrangements.
2. *Design Appeal* — Linear fluorescent tubes adaptable for novel patterns, concealed strips or coves designed for decorative effects.
3. *Freedom from Heat* — "Cool Light" is now available for cases containing delicate fabrics or foodstuffs. Air conditioning systems can be relieved of radiated heat loads.
4. *Artificial Daylight*—New facilities for matching colors of yard goods, garments, ties, hosiery—and economically.

Industrial applications for fluorescent illumination are developing daily. Here are the principal ways the factory can benefit.

1. *Heat Relief* — Close-to-bench lighting sometimes needs 100 foot candles or more for critical seeing work. Fluorescents can be massed right over the workers without annoyance.
2. *Glareless Illumination*—Linear tubing can be arranged in paralleled combinations of low surface brightness to give a wide-area effect. Sharp reflections and glare from shiny objects or surfaces are nullified.
3. *Color Matching*—Grading, sorting and inspection tasks offer many practical applications for the daylight fluorescent lamp.

And in addition decorative applications for homes, amusement places and public buildings are unlimited. Meanwhile the efficiency of fluorescent light sources provides a practical solution to many illumination problems.

From the wiring standpoint, the greater lumen-per-watt output values of fluorescent lighting will solve many problems where inadequate copper is making trouble in existing circuits or feeders. But re-lighting installations will require considerable wiring and installation work. There must be juice at both ends of the tube and a ballast must be provided. Therefore, the contractor needs the latest literature from lamp manufacturers and those who make the units, coves, strips and other accessories for fluorescent lighting.

Whether you are engaged in commercial, industrial or residential work, here is a new opportunity. The fluorescent tube is more than just a new lamp product. It is a revolutionary development with a broad market.

Why it meets the needs of ALL FOUR

Regardless of who you are—Cutler-Hammer Service Control is built to your requirements. From the standpoint of the Power Company, it is built to play its full part in safeguarding public goodwill and reducing trouble-breeding service calls. From the angle of the Wholesaler, its sales features add a magnetic "pull" which ties in happily with his "push." For the Contractor, it enables him to get onto the job and off again with a minimum of time and a maximum of satisfaction. To the Householder, it brings safety, simplicity, satisfaction and the all-important attractive styling and appearance. That these qualities are provided in abundant measure can be traced directly to the engineering leadership of Cutler-Hammer... to its broad, deep and intimate contact with the necessities of electric control equipment for more than 45 years. CUTLER-HAMMER, Inc., *Pioneer Electrical Manufacturers*, 1306 St. Paul Avenue, Milwaukee, Wisconsin.

CUTLER-HAMMER
SERVICE CONTROL
C-H

C-H Multi-Breaker
(At right) Most modern of this type of equipment. Fool-proof, safe, economical, convenient from every standpoint.

The New C-H Tri-Branch Fuser
(Below) Exclusive C-H, 3 fuse-protected circuits for each unit; economical means of adequate wiring. Small, attractive, easy installation, builds loads and business.

C-H Trailer Camp Panel Bulletin 4389
(At left) 30-ampere, 3 branch circuit device with 3-plug fuse receptacles in Raintight case; ¾" conduit hub in top and slot in bottom for extension cords. Designed specifically for trailer camp operators.

C-H Type D "PULLER" Switch
(At right) Entirely new principle of front operation. Small size with big wiring space. Ten outstanding features. Dead Front. Aluminum finish. Low cost. C-H No. 4302-H1.

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Editorials

Earl Whitehorne, Editor

New Business in The Wage-Hour Law

The Federal Wage-Hour Law which became effective on October 24, initiates a new economic relationship for the nation's employers. This law is perhaps one of the most important acts ever passed in our history as a nation, because—

1. It sets up minimum wages for various employment, limits hours of work, and makes illegal the employment of children—for those engaged in interstate commerce.
2. This law contains provisions for raising the minimum wage level and shortening total weekly hours of employment over a seven-year period.
3. Already some eleven states have enacted, or are preparing legislation to adopt similar measures for controlling intrastate employment. More will.

The effect of this legislation upon electrical contractors and motor shops will be two-fold. Some may need to adjust schedules among their clerical and lower scale employees. But eliminating cheap labor and shortening the work week will impel management to improve production facilities.

So the Wage-Hour Law may well open doors to new markets for better factory lighting, control, ventilation, signaling. This should be discussed with your factory-customers.

Study Your Man

General contractors are funny ducks. Many electrical contractors sidle off and look at them as some sort of snake or he-devil. Others break down and make friends once in awhile.

But one contractor in Bakersfield figured that it might be worth while learning what one peculiar general contractor wanted anyway. It took him two years to find the answer.

What was the secret? This general was nervous and when he said scat, he meant scat. He wanted action. When he was ready to start, he was ready, no foolin'. He wanted the electrical contractor's men on the job and rarin' to go.

So now this electrical contractor anticipates him. Not only does he get on the job with fire department speed but—he keeps the general on the run to keep up with his wiremen. And he keeps this man's business at a premium on price.

NEMA Good News

Good news for contractors came out of the recent NEMA convention. Next year's budget for market development covers 89 projects. It includes ranges, water heaters, roasters, commercial cooking and kitchen modernization, adequate wiring, rural electrification, industrial electrification, highway lighting and institutional safety. Everyone of them means more and better wiring.

The electrical industry has never been so well organized to build a greater market. And now here comes prosperity!

This is the Simple Answer

At the Cleveland inspectors convention a Miami man pointed out the way to clean up the house wiring business. In a word, he said—

"Get the architect to make plans and specifications for every electrical installation in a new house and have them passed by the local inspector. Secure bids on this basis and permit no changes without authorization. When the work is inspected, check with the plan."

That's what we have been arguing for and it should be a simple idea to sell. It just means putting some order into the sales procedure. It can be done.

Get Busy on Mass Housing

Right now government officials and building supply companies are working out plans for a housing program to lift the country up into prosperity. Objectives include standardized designs and specifications for building private residences in groups of ten or more at a cost of around $2500 each. This calls for new mass production principles, gearing local man-power and contractor experience to a common purpose—with close profit margins prevailing.

But we must guard the public. In its zeal to lower costs, wiring adequacy can too easily be relegated to bare electrical needs of pre-war days. One man on the sub-committee for mechanical design has admitted that wiring might get "step-child" consideration. Lets look out for tight wires, for electrical hazards that will be created by skimped wiring.

The Worker Views the Code

Electrical workers—the IBEW—have never been officially a part of the industry's code-making personnel. Nevertheless they take a keen interest in what is proposed by way of Code revisions or new rules—and rightfully so. The Code controls their work.

Many of the inspectors throughout the land came into their positions from the ranks of electrical workers—a large number from IBEW locals. So IBEW men feel quite at home with the inspector. This fall, for instance, officers of IBEW were present at the five annual conventions of the IAEI sections. The *Journal of Electrical Workers* is emphasizing the journeyman's stake in Code changes and opposes attempts to introduce cheaper methods of wiring.

Start in the Home

"For a big contractor, you seem to be pretty active in the Adequate Wiring program. What do you expect to get back? You don't do house wiring," we asked a Seattle contractor.

"You'd be surprised," he answered. "I got the rewiring of a 10 story building last week, as a result of the publicity adequate wiring is getting around here. For people who live in

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houses often own or operate business buildings."

Up in British Columbia they traced back a lot of office relighting jobs to a home lighting girl of the power company who convinced the boss's wife she needed a new deal in home lighting. The boss liked it so well he thought it would be a good idea for the office too. Maybe electricity begins at home like charity.

Spinach

A fixture manufacturer says that he is worried. The public has been buying IES lamps because they really give light to see by. Homebuilders are turning away from the twisted brass tubing and the candles drooling imitation wax. What to do about it?

Too many lighting fixtures people thought style was lighting. They shot their wad on period imitations that were flashy, but hell on the eyes. They forgot that the purpose of lighting fixtures was first to provide comfortable light and after that they could be arty. And the public up and left them for the convenient and helpful IES floor and table lamp—despite its unappealing name.

There's a lesson in that for contractors too. Maybe we'd better think more about what the customer expects to get out of his wiring before he tosses us out as spinach along with the fixtures.

Tie In the Sign Men

Gradual changes in electrical display methods are bringing the electric sign and display men closer to the rest of the electrical industry. Yet few communities have taken steps to include these people in the affairs of the family. We are overlooking something.

New illuminants and new applications for built-in structural designs tend toward confusion. When to call luminous tubing an illuminating medium or a display effect becomes more doubtful with each new development. Already there is some overlap. There will be more in the near future. And it all needs wiring.

The sign men should be invited and encouraged to belong to our leagues and associations. It should help them. It should help us. And the public will be saved more confusion.

Photographers Welcome!

Chicago's huge sports arena, the Stadium, is angling for championship box fights. One move is the recent installation of a brand new lighting system.

General Manager McCloud knows a thing or two about publicity and professional sport. And what's more he knows something about lumens and watts. Sport page pictures ring sweet music in the box office. But newscamera men waste few plates in an arena where pictures are limited to the range of flash bulbs. Given enough light to make dramatic action pictures, however, photographers will haunt the place.

Here is a new angle on the subject of professional sports lighting. Such layouts need light not only for seeing but light for the camera eye. Promoters are sensitive to any suggestion that will get them more publicity. It's up to the contractor to sell this idea.

Back Talk

Not Enemies

To the Editor—I want to compliment you on the editorial 'What Kind of Folk'. Any electrical contractor who is a member of an association, local or national, can realize what your words mean.

But what should be done is to send this message to the thousands of contractors who belong to no association. Let them realize that their competitors are real guys instead of their enemies and chiselers. This is a message that the whole industry should have, boiled down to a few sentences that they can understand.

I cut your editorial out of my magazine and handed it to an electrical contractor who has never belonged to any kind of an association. I told him to read it and digest thoroughly the last sentence of the third paragraph.

W. W. Ingalls,
Ingalls Electric Co., Miami.

Thanks, Mr. Ingalls. And we are glad to say that this paper now reaches thousands of contractors who belong to no association. We wish they did. But meanwhile, in various ways we are trying to show them the value of organized cooperation.

Selling Adequate Wiring

To the Editor—If we are to sell this thing called adequate wiring, we must develop a program that will reach the prospective customer in the most direct and impressive manner. The man who talks adequate wiring must be well informed on Code requirements, voltage drop and energy loss; also approximate costs of new services, multibreakers, panels, base outlets, wall switches, other outlets and new fixtures.

The man who can do this best is the qualified electrical contractor. So his local association should put on a direct mail campaign and circulate all customers of members, the contractors to bear the cost. All contractors should be invited to join this selling campaign, but only those who are willing to do their share of the promoting should be helped by the association.

If we work out something along this line, we can sell lots of adequate wiring, because the public is getting dammed tired of slow heating irons, burned out refrigerator and washing machine motors, dimming lights, fading out radios and blowing fuses. Far too many of the residential wiring systems remind me of the famous steamboat on the Missouri River. They had to stop the engine to blow the whistle.

After making numerous tests on the wiring of the better class of old houses, we find that most people are ironing with from 90 to 110 volts when they should have 120 volts.

"Electric" Craton,
New Orleans.

Mr. Craton, your proposal is sound. This sort of work should be going on in every city, backed by the cooperative support of all active contractors. Wiring is a salable idea, right now, with present methods and materials.

Not "Demanding"

To the Editor—Your October editorial has just come to hand and I do think it is down the right line. Certainly by cooperation and understanding we are going to accomplish much.

Just one word about the Code—Power companies are not 'demanding'. We are trying to reach the basis of understanding about which you write, and we are making great and sincere efforts to see to it that every one concerned has intimate knowledge of the situation. Would you perhaps consider in this connection (to follow out your own ideas) printing an article explaining in technical detail the reasons for the changes discussed by the Institute?

Edward T. Gushee, Vice President,
Detroit Edison Company.

It has sounded like demanding to us, Mr. Gushee. Maybe it was not meant to be. And we would be delighted to publish the reasons why the power companies want the Code changes that EEI proposes.

Cost of Wiring

To the Editor—I was favorably impressed by your editorial "What Kind of Folks?" I think you are now taking exactly the position I have always advocated. I regret exceedingly that it took the hard-boiled, arbitrary methods of the REA to bring this about, and that the efforts of the utility companies in the past to accomplish it by cooperation were unavailing.

Utility companies have always been the contractors' best friends. They have never desired to interfere with contractors' legitimate profits by cutting legitimate prices, and have employed every conceivable means of building up contractors. In fact, have worked tirelessly in an effort to educate contractors to prevent their universal tendency of curtailing the amount of wiring for the purpose of making a lower bid, and at the same time reduced their own volume of business and profits.

We always contended that improvements in the art have resulted in better, simpler, safer, more flexible, and more economical methods of doing certain classes of wiring, and felt that this improved kind of wiring should be adopted for the benefit of all concerned. This new wiring will produce greater volume and greater profits.

If you will continue your crusade along these lines, you can be of great service to contractors and demonstrate the recognition of advances and improvements in wiring by the profits which these improvements can bring about.

H. E. Young, Vice President
Northern States Power Company,
Minneapolis

This sincere expression is appreciated. But we do not feel that the need for new methods in rural wiring alters our opinion that house wiring is worth its cost and can be sold as is, in towns and in cities. We have ever advocated the development of new wiring materials less costly to install, so long as they are safe, but have urged that meanwhile we sell what we have. We agree that real cooperation between power companies, contractors and inspectors is vital to such progress.

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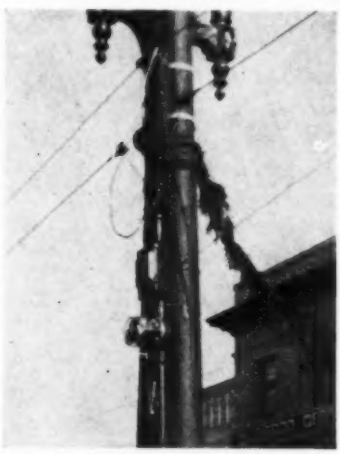
WIRING Methods

FOR STREET DECORATIONS

What to do about wiring for street decorations during Christmas and other festive occasions has puzzled many an inspection department. The city of Oakland, in cooperation with the Downtown Merchants and the Pacific Gas and Electric Company has developed a permanent solution for the problem which T. L. Rosenberg, electrical contractor, installed throughout the main downtown



BLOCK LIGHTING — Oakland has made permanent provision for decorative lights by installing pole mounted outlets on each block.

area. Carl Hardy, chief of the department of electricity designed the plan.

On each side of every block a 1½-in conduit is brought up the outside of a street railway pole from an adjacent underground manhole to a socket meter and a 60-amp. 230-volt rain-proof, externally operated switch and a service head. Three No. 6 wires have been pulled into the switch and provide a circuit capacity of 11½ kw. for decorative street lighting on each side of a block.

After considerable negotiation it was decided that the ownership of the property would be retained by the utility and maintained by it. On festival occasions the energy used is billed to the merchants along the block in which the lighting is employed. Several advantages accrue from this arrangement. First, a permanent installation of this type removes the necessity for "haywire" hookups every time decorative lighting is wanted. There is no need now to tap the circuits in the buildings which may either be already loaded or if not loaded at the present time may later be loaded to over capacity. The equipment is not owned by the city but by the utility which has the facilities for maintaining and billing.

The weather-proof installation in rigid conduit is neat and not subject to mechanical injury from passing traffic such as a cable installation might be during rush traffic of a Christmas season. The facilities are available throughout the year for all kinds of festive occasions and celebrations rather than requiring a new installation each time such a civic program is undertaken.

BLUE PRINT RACK

A place for rolled up blueprints that keeps individual jobs separate and accessable is a common office problem.

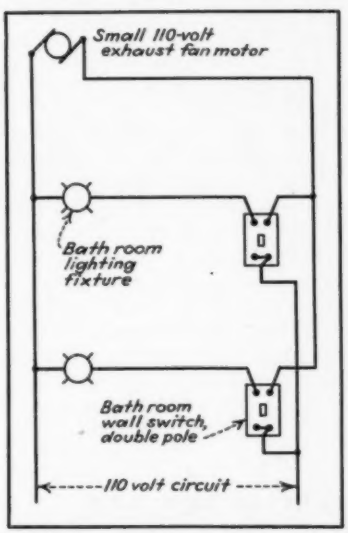
***BLUE PRINT PARKING:** Estimator Bill McGarity restores a set of plans and pulls the shade over the rack.*

The Romanoff Electric Co. of Toledo, Ohio has built a 36 inch deep rack into the corner of the drafting room that serves as a convenient blueprint storage space. The rack extends from floor to ceiling with shelves partitioned into 6 inch square pigeon holes, providing storage capacity for 160 rolls of prints.

A window shade which may be pulled down over the front excludes dust and dirt and at the same time neatly covers the open shelves.

DUAL-CONTROL FOR BATHROOMS

When small apartment houses are designed to require bathroom exhaust fans, the control scheme can be arranged to simplify operating the small fan motor. The A. J. Wolfe Company of Boston installs a double-pole toggle switch in the bathrooms and connects one pole to



DUAL SWITCHING—Bathroom light switch combined with control for small fan motor that serves several floors.

control the lighting fixture, while the other pole controls the exhaust fan motor.

The exhaust system usually serves three or four bathrooms through a common duct. Upon entering any bathroom and flipping the light switch, the fan motor is also placed in operation. The motor continues to operate until the lights in all bathrooms served by the fan are switched off.

The diagram shows the wiring arrangement for using this dual control method. Variations in the wiring scheme will occur on jobs where the size of fan motor and local rules governing circuit arrangement interfere with a common one-circuit hookup. These rules can be provided for.

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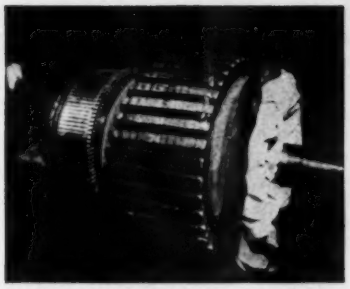
1. First to be Wrapped and SEALED in Cellophane.
2. Perfect Adhesiveness and Tensile Strength.
3. Strong Distinctive Green Core.
4. Colorful Attractive Boxes.
5. A Company in the Insulation Business Since 1878.
PANTHER and DRAGON TAPES
HAZARD INSULATED WIRE WORKS
DIVISION OF THE OKONITE CO.

Motor Shops

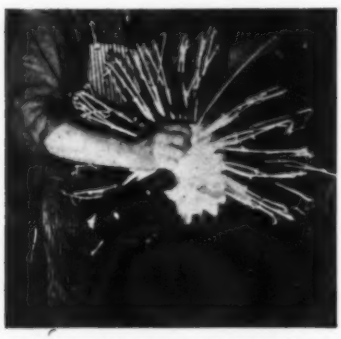


MINE ARMATURE—Careful cleaning and durable coil-end foundations essential to severe-duty rewind jobs.

REWINDING A VETERAN

Old-time motors employed windings that seem strange to the present generation of shopmen. The Electric Maintenance Co. of Boston recently rewound an armature for a 10 h.p. Sprague motor that dates back more than 30 years. It operates on 230 volts d.c., at 720 rpm., to drive a fan.

This armature had to be hand wound, using No. 8 DCC wire, 3 turns per coil and 3 coils per slot. Slots are paired



HAND-WOUND ARMATURE—A veteran of early days is being made new again.

at opposite sides of the shaft. It took 30 hours to strip and rewind the armature and reinstall the commutator. Canvas separators were used between lapped coils, varnished cambric for cell insulation, fibre in-between sticks and wood top-sticks. Two preheated impregnations completed the job for this pioneer fan motor.

MOTOR PARTS HOUSEKEEPING

As motor service volume increases, there is need for greater assortments of bearings, brushes, centrifugal switch parts and an endless number of other items. To find them quickly when needed and to keep tab on depleted stocks, The Roland Electrical Company,

OUT OF HIDING—Stocks comprising thousands of small shop parts justify investment in modern steel shelving.

of Baltimore, installed modern adjustable steel shelving. Bins are labelled to identify the type and make of parts. This speeds the time required for filling orders. Henry Scheidt, shop foreman, who recently made extensive alterations for the company layout, considers good parts housekeeping one of the most important considerations.

ARMATURE COIL PROTECTION

Coal mine locomotive motors get severe use, therefore armatures are given a good insulating foundation before new coils are installed in them by the Scranton (Pa.) Electric Construction Company. Here we see a 250-volt armature from an HM819, 10-ton locomotive, which has 39 slots and 117 bars. It is all ready to receive its new coils for a wave winding.

The commutator shell is protected with three edgewise discs of 1/32-in. press board. Back-plate insulation is made up of four layers of .007-in. red rope paper with three sheets of .010 varnished cambric spaced between. Glyptal oil-proof enamel is used as a binder. The hood which will cover the coil ends is made of No. 12 canvas.

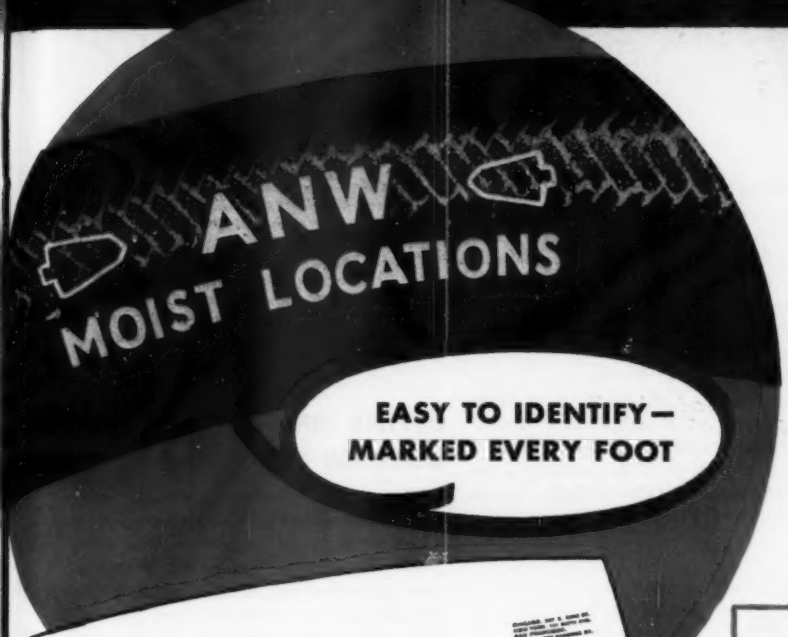
CEILING TRANSPORTATION

Taking a tip from the Detroit auto plants, where most of the transportation of parts is by monorail, the Miller-Seldon Electric Company shop has one of the most complete "ceiling railway" systems to be found in the motor repair industry. With a main track centered lengthwise in the shop aisle, there are also lengthwise tracks along the sides. All three tracks are inter-connected at intervals with diagonal switches. From the two outer tracks there are curved "spurs" extending into each side bay.

NO FLOOR TRAFFIC—Unusual three-track monorail system which serves all shop bays for easy handling of heavy work.

APPROVED

for moist locations without lead sheath



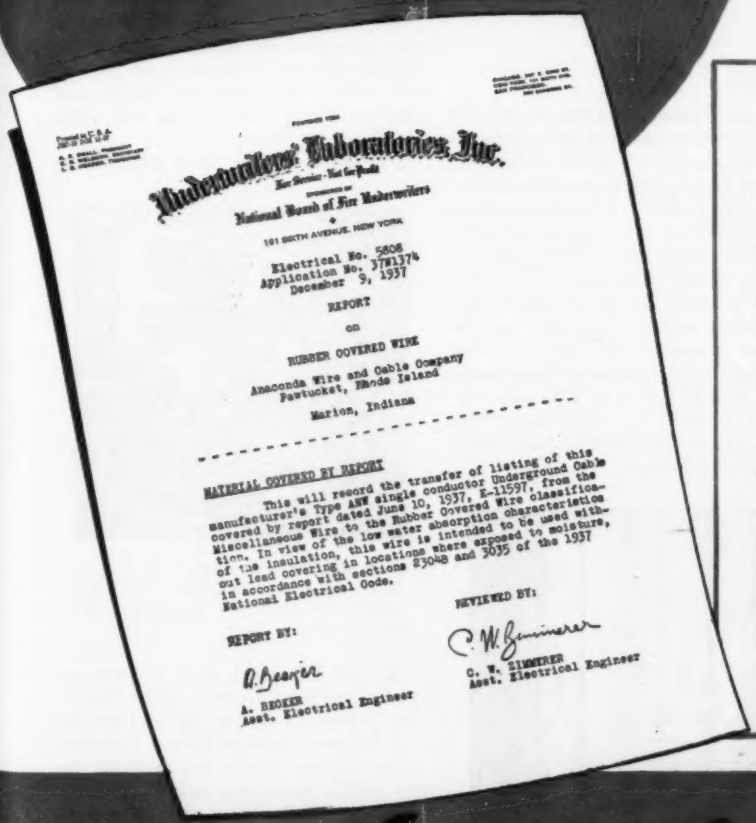
...and marked for easy identification

ANW insulated cable has established an enviable operating record in network service. Under extreme exposure to moisture and other adverse conditions, ANW has performed without a single reported failure.

The remarkable characteristics of this type of insulation, principally moisture-resistance, were soon recognized as ideal for other uses, particularly where heretofore only lead sheathed cables had been applicable. After careful tests, Underwriters' Laboratories has now given approval for the use of this type cable in *moist locations without lead sheath.* See letter below.

Easily identified, this cable is plainly marked every foot as illustrated—for installations under jurisdiction of the National Electrical Code.

Important economies are possible by using ANW insulated cables for your next job. 38435



Underwriters' Laboratories, Inc.
Not for Profit
Investigators for
National Board of Fire Underwriters
207 SIXTH AVENUE, NEW YORK

Electrical No. 5808
Application No. 37H1374
December 9, 1937

REPORT

on

RUBBER COVERED WIRE

Anaconda Wire and Cable Company
Pawtucket, Rhode Island

Marion, Indiana

MATERIAL COVERED BY REPORT

This will record the transfer of listing of this manufacturer's Type ANW single conductor Underground Cable covered by report dated June 10, 1937, E-11597, from the Miscellaneous Wire to the Rubber Covered Wire classification. In view of the low water absorption characteristics of the insulation, this wire is intended to be used without lead covering in locations where exposed to moisture, in accordance with sections 2308 and 3035 of the 1937 National Electrical Code.

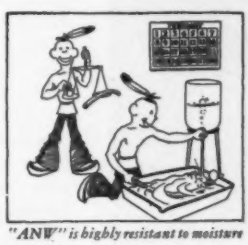
REPORT BY:

A. BECKER
Asst. Electrical Engineer

REVIEWED BY:

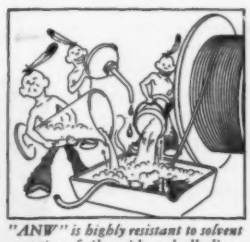
C. W. ZIMMERER
Asst. Electrical Engineer

SEND FOR BOOKLET DESCRIBING THESE IMPORTANT IMPROVEMENTS IN CABLE



"ANW" is highly resistant to moisture

"ANW" is highly resistant to flame



"ANW" is highly resistant to solvent action of oils, acids and alkalis

"ANW" is easily handled in extreme temperatures

ANACONDA
Copper mines to consumer

USE MODERN IMPROVED **Anaconda Wire & Cable**

ANACONDA WIRE & CABLE CO. • *General Offices:* 25 Broadway, New York • *Chicago Office:* 20 North Wacker Drive • *Sales Offices in Principal Cities* • Subsidiary of Anaconda Copper Mining Company

UMI

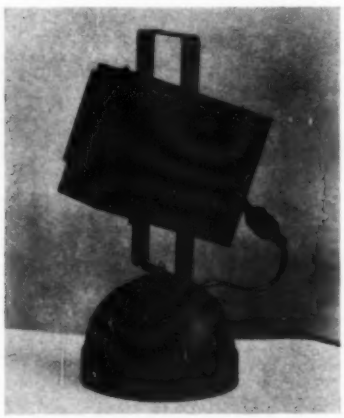
Better Lighting

COMMERCIAL APPLICATIONS FOR "BLACK-LIGHT"

The use of filtered ultra-violet "Black-Light" upon fluorescent materials offers a means of visual identification, detection, comparison and analysis. The major advantages of ultra-violet examination are:

1. Simplicity
2. Sensitivity
3. Rapidity
4. Leaves no tell-tale marks

Portable quartz lamps and filters allow only the invisible ultra-violet, or "black light", to pass. This ray cannot be seen by the eye, yet its radiations are absorbed by a wide variety of substances and re-emitted as visible light.



BLACK RAYS from portable projector bring out fluorescent marks or stains. Mercury vapor or other lamps used.

Commercial applications for "black light" sources are:

1. Examination of prisoners' correspondence to detect the use of common liquids as "invisible" inks.
2. Detection of invisible laundry marks, some of which are visible only when viewed in ultra-violet light.
3. Fluorescence fingerprint technique, utilizing the natural fluorescence of oils and fatty materials normally contained in fingerprint impressions.
4. Examination of documents for eradications, erasures, alterations, over-printing, artificial water-marks.
5. Examination of forged bank notes.
6. Ultra-violet examination of clues.
7. Detection of seminal and blood stains
8. Detection of tampered seals
9. Identification of teeth
10. Examination of bones.
11. Detection and identification of drugs
12. Examination of industrial processes.

Portable projectors for this purpose use either H-3 or H-4 mercury lamps or T20 projection, G30 spotlight, Mazda CX or No. 1 Photoflood lamps.

MURAL LIGHTING

Narrow channels suspended vertically before a conventionalized oriental mural in the Bombay Room of the Fontenelle Hotel in Omaha, Neb. provide an unusual lighting effect. The four channels are suspended in pairs and embellished with metal ornaments in oriental design. Lumiline lamps concealed within the channel provide the light. Cutout patterns backed with colored glass are cut into the channels and colored jewel bezels add to the striking appearance.

The installation was made by the Sterling Electric Co. of Omaha, Neb. and the fixtures designed and fabricated in their fixture shop.

MURAL LIGHTING units of bizarre design add to the oriental effect of mural.

STACK LIGHTING EXAMPLE—Twelve floodlights with narrow beam lenses and 1000-watt lamps make the 255-foot stack of the Seagram's $6,000,000 Louisville distillery a night landmark visible for many miles. The stack is made more prominent by using a higher level of intensity than the floodlighting for surrounding buildings. Check up such prospects in your town.

LIGHTING FOR INSPECTION

Warner and Swasey Company, machine tool builders of Cleveland, recently relighted its final inspection line with gratifying results. Sidney W. Watkins, their electrical engineer, says that the men are able to concentrate on fine details without eyestrain or fatigue and that no tiring glare from the light sources is experienced.

The unusual thing about this system is that 35 Pittsburgh show window reflectors are used, located on 3-foot centers, 7 feet above the lathes, equipped with 200-watt Daylight lamps. Approximately 60 foot candles are available for this critical inspection task.

FOR ACCURACY—Show window reflectors used along machine tool inspection line on three foot spacing and 200 watt lamps.

The lighting circuit uses Knockout Strip, permitting a unit every 12 inches, although 3 feet appears to be satisfactory.

"It's a BIG JOB to sell ADEQUATE WIRING *in* Old Homes —*but the* FUSTAT can help you do it"

Stops overloading that hinders the full use of electricity

The branch circuit is the "bottle-neck" of electric service, because through it flows all the "pay load" to the user. As this "bottle-neck" is overloaded, SATISFACTORY service diminishes because:

1. Overloading usually means a low-voltage condition that causes user dissatisfaction due to inefficient operation of lamps and appliances.

2. Overloading, when continued often destroys the wiring and causes money loss to the user — revenue loss to the Utility and tremendous loss of good will to the entire industry.

The Fustat steps in to help correct this overloading evil

Its non-tamperable feature shuts out "handy men" from substituting too large a size, and tampering it in any way to permit overloading is virtually out of the question — without such tampering being clearly visible where it warns the user that all protection is gone.

Since the user can't load a circuit beyond proper capacity of the copper, the Fustat eliminates revenue sapping low-voltage conditions —

And by blocking excessive overloading it prevents overheating that destroys wiring, creates fire hazards and causes costly shutdowns.

In addition, when a Fustat does blow to protect, only the *normal load* on one circuit is off the line — instead of a user possibly having a large part of his lights and appliances out of service.

User can't side-step adequate wiring issue

When additional circuits are needed the user cannot readily side-step the issue at the sacrifice of safety. New circuits that increase efficiency of appliances and encourage their greater use must be installed.

Permits more outlets per circuit

Adding a maximum number of outlets is a perfectly safe practice because the Fustat guards the circuit against overloading.

Wipes out any excuse for tampering

A Fustat won't blow when washing machines, refrigerators or other motors start because of its long time-lag. It wipes out any excuse for tampering or the use of fuses too large to properly protect when shorts occur in flexible cords.

Helps get more appliances on the line

The circuit can be loaded to approved capacity without needless blows — or sacrifice of safety — for the Fustat doesn't blow on starting currents.

What is the Fustat?

Adapter retails at 7½c

It is a fuse to which a thermal cutout is added.

It protects like a fuse against short circuits—even high resistance shorts such as occur in flexible cords.

It protects against permanent overloads, even when as light as 25%.

Yet it will not blow on motor starting currents of washing machines or other appliances.

It has a non-tamperable base that keeps anyone from robbing the circuit of protection.

It fits Edison base fuseholders through the use of an inexpensive adapter.

It's just good business to sell, install and use Fustats

The FUSTAT

For full information write to any of these firms

BUSSMANN MFG. CO., University at Jefferson, St. Louis, Mo.
JEFFERSON ELEC. CO., Bellwood, Ill.
KIRKMAN ENGINEERING CORP., 121 Sixth Ave., New York City
NATIONAL ELECTRIC PRODUCTS CORP., Fulton Bldg., Pittsburgh, Pa.
UNION INSULATING CO., 27 Park Place, New York City

UMI

PRIVATE INTERIOR TELEPHONE SYSTEMS

Easy to Sell
Easy to Install

INTERCOMS

Common-talking, selective-ringing systems in capacities of two to eleven stations. Beautifully designed, and durably constructed for long faithful service. Operate from dry cells or battery eliminators.

AUTO-COMS

Deluxe intercom. systems, providing selective talking and selective signaling service for a maximum of ten stations, and up to five connections at one time. No automatic switchboard needed.

SERV-U-FONES

Attractively priced common-talking systems in capacities of two to ten stations. Conveniently packaged, simple to install. Dry cell operated.

P-A-X's

Private Automatic Exchange systems, available in all capacities. Use standard automatic telephones and provide for a variety of special communication services.

Easy to Sell. **Automatic Electric Private Interior Telephone Systems are easy to sell because the market is particularly receptive. People are communication conscious—keenly aware of the time-, step- and money-saving advantages of intercommunicating service in offices, shops, factories and homes. And they are ready to buy!**

This business belongs to you—cash in on it. It is within your field, the market is still practically untouched, and the profits are attractive. If you need help, the Automatic Electric field man is at your service.

Easy to Install. **Automatic Electric Private Interior Telephone Systems are easy to install because each piece is labeled for instant identification, all equipment is designed for quick assembly, and complete instructions are expressed in brief, simple, non-technical language.**

Shown here are four of the many types of Private Interior Telephone Systems available. Our field representative will gladly supply you with literature, prices and discounts, as well as work with you on specific jobs. Call on him.

AUTOMATIC ELECTRIC

PRIVATE INTERIOR TELEPHONE SYSTEMS

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UMI

Maintenance

LOOKING BACK AT WHAT YOU KNOW

A MAN'S knowledge needs organizing as well as his day's work. He may have had a lot of experience with electric heat, for example, but unless it is a matter of daily activity, he can soon go rusty on it. Then when some question arises he is not sure.

It is worthwhile now and then to review this background knowledge and so this series of Guide Sheets on Maintenance Practice. Here step by step, the major features of industrial electrical equipment are discussed, as a practical check-up in which the maintenance man can comb over the successive subjects and bring his memory up to date.

This series of articles began in January with a frank review of the electrical maintenance man's job. Then came—

1. ALTERNATING CURRENT MOTORS—Types and Applications
2. DIRECT CURRENT MOTORS—Types and Applications
3. ALTERNATING CURRENT MOTORS—Maintenance
4. DIRECT CURRENT MOTORS—Maintenance
5. A.C. MOTOR STARTERS AND CONTROLLERS—Types and Applications
6. D.C. MOTOR STARTERS AND CONTROLLERS—Types and Applications
7. MAINTENANCE OF CONTROL EQUIPMENT
8. SPECIAL CONTROL PROBLEMS — Heavy Installations and Maintenance
9. ELECTRIC DISTRIBUTION—Circuit Protection—Power Factor Correction
10. LIGHTING—Applications and Maintenance
11. ELECTRIC HEAT—Types, Applications and Maintenance (this issue)

Coming articles will discuss

12. ELECTRIC WELDING—Types, Applications, Control
13. INTERPLANT COMMUNICATION—Types and Common Maintenance Problems
14. INSTRUMENTS—Types, Application, Care
15. POWER TOOLS—Types, Application, Care
16. BATTERIES AND RECTIFIERS—Types and Maintenance
17. ELECTROPLATING — Maintenance Aspects
18. ELECTRONIC DEVICES—Types and Applications

Electric Heat

Application and Maintenance of Heating Units, Ovens, and Furnaces.

ELECTRIC Heat has definite advantages well recognized by industry in general. Its numerous applications have brought about the development of a diversity of electric heating units and equipment. However, they may be divided roughly into three classes—small heating units, ovens and furnaces.

Small Heating Units

Small heating units may be divided into three general types:

(1) **Cartridge unit**—has round cross section, with resistance wire wound or supported on a cylindrical refractory core to keep the resistor near the outside cylindrical surface of the unit.

(2) **Strip heater**—has a rectangular cross section, with a number of resistance wire coils located in the same plane.

(3) **Tubular unit**—has a round cross section, with a single coil of resistance wire.

From these three forms many other types have been developed. For example: ring unit which is developed from a strip heater but in a form as the name indicates.

Contact heating is used for most work for temperatures under 1,000 deg. F.; air heating being an exception. Heating units are furnished with steel sheath for use where the surface temperature of the unit will not exceed 750 deg. F. They are furnished with alloy steel sheath for use where the surface temperature will be between 750 and 1,200 deg. F.

Applications of these types of heating units are numerous. Some are:

(1) Air—crane cabs, watchmen's houses, valve houses, and other hard-to-heat or out-of-the-way places, also annealing, baking and drying ovens at temperatures up to 900 deg. F.

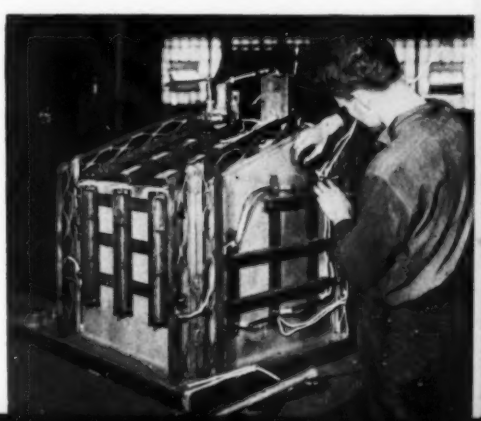
(2) Compounds, fluids and metals—boilers, kettles, sterilizers, tanks and vats, also pipe lines carrying compounds at temperatures up to 900 deg. F.

(3) Metal dies and platens—press molds, platens for plastics, and revolving rolls.

(4) Other uses—preheating lubricants, in air conditioning, and as resistors for absorbing overloads or inductive kicks.

Some typical applications of individual types of heating units are: (1) Metal plates and molds heated with cartridge units which are inserted in holes drilled to a sliding fit, or ring units or strip heaters placed between

UNIFORM TEMPERATURES are obtained with electric heat. On this tank for melting asphaltum compound, strip heaters are being clamped to the sides and bottom with angle iron bars. (Edwin L. Wiegand Co. photo).



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LABORATORY OR TEST OVEN, rated 9 kw., equipped with recirculating fan inside at top, automatic control panel and indicating temperature controller. Door has roller safety catches which will open with a sudden increase of pressure on the inside. (Young Brothers Co. photo).

two sections of the part and in good contact.

(2) Kettles, pots, and tanks heated by ring units or strip heaters clamped to the outside of the containers, or immersion units which have the heated section immersed directly in the material.

Industrial heating cable, originally used for soil heating, is another form for local heating. It has a lead sheath, can be wound on forms or bent to conform to a contour, and distributes a mild even heat over the area.

Standard lengths of cable are 60 and 120 ft., rated 400 and 800 watts, for 115 and 230 volts, respectively. Outside diameter is approximately ¼ in.

Some applications are: winding around pipes; immersion in tanks; placed on pumps or around valves of sprinkler systems; imbedding in walks to melt ice and snow; inserted in hot beds and cold frames.

Selection of heating units depends on the type and construction of the device or machine, space available for the unit, quantity and temperature of material to be processed, and time. Methods for calculations and number of units to be used can be obtained from manufacturers' catalogues.

Cartridge units, ring units and strip heaters require close fitting to the material for rapid heat transfer, otherwise an air gap would cause the surface temperature of the unit to exceed the safe limit, and so the heating element will burn out.

Maintenance of small heating units calls for the following points to be checked:

1. Make periodical tests for wattage that is developed in comparison with the original installed capacity.
2. See that there is no voltage drop between power source and installation of heaters.
3. Periodically clean heating surface of immersion heaters to prevent formation of coating of boiler scale or carbonized material.
4. Make voltage tests at heater terminals. Electric heating units should not be installed where line voltage is more than 5 per cent above rated voltage of the heater.
5. Keep in stock several spare heating units of each type in general use, where production must be maintained without interruption.

Since the advent of small heating units, many portable and semi-portable electric heating devices for specific applications have come into use. Some of the devices are: soldering irons, glue pots, compound-melting pots, large and small metal-melting pots, industrial air heaters, branding irons, kettles, electric units heaters, hot plates, and electric steam generators.

Electric Ovens

The main difference between an oven and a furnace is in its operating temperature. An oven is usually thought of as having a maximum operating temperature of 750 deg. F.

The color line or appearance of red heat forms a natural division between ovens and furnaces. Above 1,200 deg. F., clearly showing a cherry red color, the application is one for furnaces built of refractory and insulating brick. Below 900 deg. F., the lower limit of visible color, the field is served by ovens usually made of sheet metal and light weight insulation. Because of the difficult economic problems encountered between these limits, there is considerable competition between ovens and furnaces.

Applications of electric ovens are: (1) baking of finishes on metal parts; (2) electric production and repair shops, baking armatures and coils; (3) drying operations: (4) low temperature heat treatment, aging, and tempering; (5) baking sand cores in foundries; (6) processing food products; (7) miscellaneous preheating and shrinking; (8) testing.

Selection of an oven, should be based on the following information: (1) material to be processed; (2) weight of material of parts; (3) kind of processing such as baking or drying; (4) weight of handling equipment such as trays and trucks; (5) time for processing; (6) initial temperature of air and material or parts; (7) ventilation or air changes per charge, particularly required if gases are given off which must be exhausted to reduce explosion hazard.

Total power consumption and demand may be calculated by taking into consideration heat requirements for the following:

(1) Radiation heat lost through the oven walls and roof.

(2) Ventilation heat lost by number of air changes per charge.

(3) Absorption or useful work—quantity of heat used to heat the charge, including trucks, cars, hooks and handling apparatus.

(4) Door loss or operating factor—heat lost when doors are opened between heating cycles, depends on length of time and frequency of door opening, and determined by empirical factors.

On another page there is a chart which gives essential data and will aid in the selection of electric ovens; also an example for determining the power required.

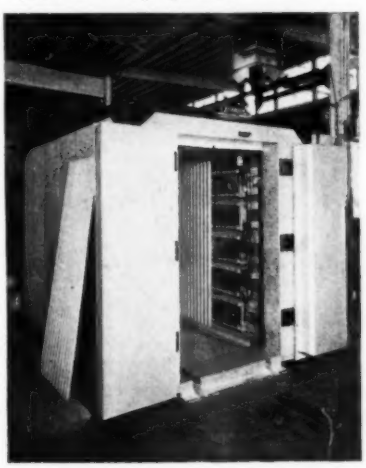
Recirculation of air, either horizontal or vertical and determined by the physical nature of the load, is used in varying degree to promote uniform temperatures throughout the processing zone of the oven.

Electric heating units for ovens are: (1) enclosed strip heaters; and (2) open nickel-chromium ribbon resistors mounted on frames which can be readily assembled along the inside of an oven wall or floor, or installed as a bank, and air to be heated is blown over them.

Conversion of older ovens to electric heat is not economically sound, as a general rule. Modern ovens are better insulated, provide greater clearance for better temperature distribution, and are equipped with recirculating systems for which no allowable clearances were made in the older ovens.

Maintenance of electric ovens requires: (1) An occasional touching up of relay points and contactor tips if loaded near capacity; (2) a monthly

ACCELERATED AGING of aluminum castings at 350 deg. F. for 2 hrs. is obtained by this recirculating type of electrically heated oven. View shows how heaters are actually mounted in the oven. (Gebnrich Corp. photo).



Methods for Calculating Power Requirements

SELECTIVE CHART FOR ELECTRIC OVENS

TYPE	LOADING METHOD	WORK SPACE IN FEET			TOTAL LOAD IN POUNDS	AVERAGE KW.-HR. FOR 1-HR. BAKE**	
		Wide	Deep	High		300 Deg. F.	500 Deg. F.
Cabinet	Hand	3	3	3	100	5.4	10.0
		4	3	4	150	7.8	14.5
		5	4	5	300	13.5	25.0
Kiln	Hand	5	5	6	* 600	14.7	27.5
	Truck	6	6	6	800	19.9	37.1
	or	6	8	6	1200	26.4	49.5
	Rack	6	10	6	1500	32.4	60.5

* Load includes truck or rack.

** Based on 4-in. insulated walls and average ventilating conditions. Kw. connected load slightly higher.

METHOD FOR DETERMINING POWER REQUIREMENT

GIVEN: Kiln type oven with a working space of 5 ft × 5 ft. × 6 ft., and 4-in. insulated walls (see selection chart).

REQUIRED: Heat 600 lb. of sheet steel or iron parts per hour, total load of parts plus truck, with a specific heat of 0.12 to a temperature of 300 deg. F.

FACTORS: Ventilation—15 air changes per hour. Air temperature—70 deg. F.; weight 0.075 lb. per cu. ft.; specific heat 0.24.

For 4-in. walls, radiation constant is 0.35 B.t.u. per sq. ft. per hour per degree difference between inside and outside walls.

Temperature difference = 300 − 70 = 230 deg.

1 kw. − hr. = 3412 B.t.u.

SOLUTION: Oven interior working space of 5 ft. × 5 ft. × 6 ft. plus allowance for space for heaters and ducts (from manufacturer's data) equals total interior space of 6 ft. 6 in. × 5 ft. 6 in. × 6 ft. 9 in. or 241 cu. ft. Total area of floor,walls and roof is 234 sq. ft.

Heat loss by radiation =
234 sq. ft. × 0.35 × 230 deg. = 18,837 B.t.u.

Heat loss by ventilation =
241 cu. ft. × 0.075 × 0.24 × 230 deg. × 15 = 14,966 B.t.u.

Heat required to heat charge or heat absorbed =
600 lb. × 0.12 × 230 deg. = 16,560 B.t.u.

Heat required for radiation, ventilation and absorption =
18,837 + 14,966 + 16,560 = 50,363 B.t.u.

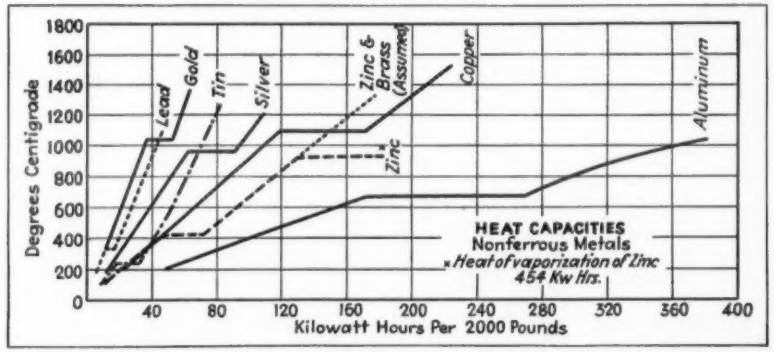
Power required = 50,363 ÷ 3,412 = 14.7 kw.-hr. per hr.

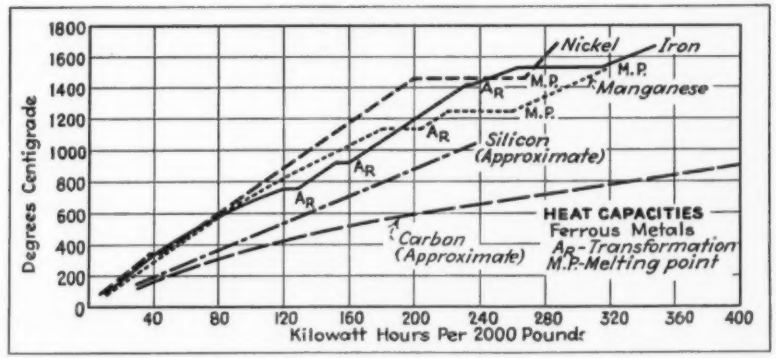
Heat loss at door = 10 per cent (estimated)

Power required for controlling and contingencies = 25 per cent (estimated)

RESULT: Total connected load or demand =
(14.7 + 10 per cent) + 25 per cent = 20.2 kw.-hr. per hr.

ELECTRIC HEAT-TREATING FURNACE



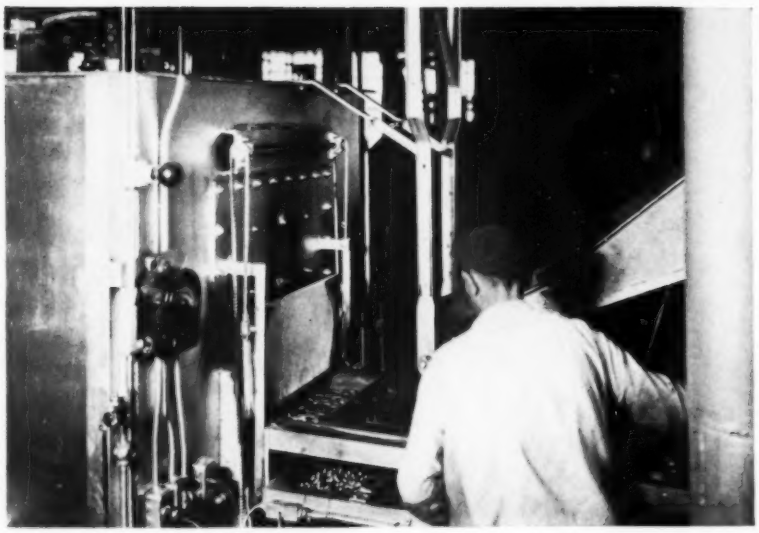


METHOD FOR DETERMINING POWER REQUIREMENT

If no soaking is required, the minimum kw. connected load required with the furnace at temperature can be figured as follows: Power in kw.-hr. required to raise work to desired temperatures (see above curves) divided by time in hours to heat the work, and result added to radiation loss in kw.-hr. of furnace at temperature. The actual connected load will be from 20 to 50 per cent greater, depending on the type of furnace and application.

SMALL ELECTRIC HEATING UNITS

Sizes, quantities and power requirements vary for applications, and can be calculated by using methods in manufacturers' publications.



HARDENING COSTS REDUCED 35 per cent and poundage increased by 15 per cent—These results were obtained by the National Acme Company, Cleveland, with the use of a 130-kw. scale-free-hardening furnace which handles 800 lb. of work per hour. The treated parts range in size from ½-in. to ⅞ in. by 12-5/16 in. In addition, the pickling and rerolling processes were eliminated in the treatment of threaded parts. (General Electric Co. photo).

inspection of heaters to see that (a) connections are tight, (b) sufficient electrical clearances are maintained, (c) no foreign objects are present to cause short circuits, and (d) oven in general is clean and particularly free of drippings. The oven heating up rate, as shown on the recorder chart, is a visual indication that all heaters are intact.

Electric Furnaces

Electric furnaces are used for heat-treating and for melting. For the latter purpose an electric arc or high frequency current equipment is used. So much of this high heat melting calls for special apparatus that it is difficult to discuss it in general terms.

This section will deal with electric furnaces for heat-treating which employ direct heat. Operating temperatures range from approximately 1,000 to 2,500 deg. F

Applications in common use are; annealing glass, brass and sheet steel, copper-brazing of steel parts, bright-annealing copper wire, heat-treating aluminum castings and steel, enameling, carburizing, case hardening, and lead and cyanide hardening.

Heat treating furnaces may be divided into two classes, according to the quantity of work to be handled, and are known as: (1) Continuous type—for treating large number of same or similar parts; (2) Batch type—for treating small production and miscellaneous parts, and for operation at varying cycles.

Protective atmospheres are used in furnaces where metal parts are heat-treated at high temperatures without oxidation and discoloration, and eliminates the necessity of subsequent cleaning operations. Controlled atmosphere is for electric furnace brazing; annealing copper, nickel, tungsten, molybdenum, cold rolled steel, silicon steel (some applications) and any steel heating process where cleaning after heat-treating is objectionable; is optional for hardening tools, copper forging and any steel heating process and is detrimental for porcelain enameling, and some applications of annealing silicon steel.

Tool hardening is a controversial field, hence its listing as optional. Hydrogen as a protective atmosphere is being produced now by small sizes of equipment. Gas carburizing has limitations which should be thoroughly understood before plans are made and equipment is purchased.

When checking into the possible output of a furnace the following fundamentals should be taken into consideration:

(1) Time required to heat the work. A common rule for steel is 1 in. per hr. to heat maximum section.

(2) Work does or does not require soaking at temperature. Some work requires time to give metallurgical properties required.

(3) Radiation loss in kw.-hr. per hr. of furnace at temperature. Be sure to include all losses.

(4) Power in kw.-hr. required to raise work to desired temperature. Values may be obtained from curves similar to those on page 29.

Three types of heating elements or units in common use in high temperature furnaces are: (1) resistors, 80% nickel—20% chrome, either flat or round; (2) cast alloy resistors; (3) globars. The first two groups are used for furnace temperatures up to 2,050 deg. F. and third group or globars, for temperatures up to 2,500 deg. F.

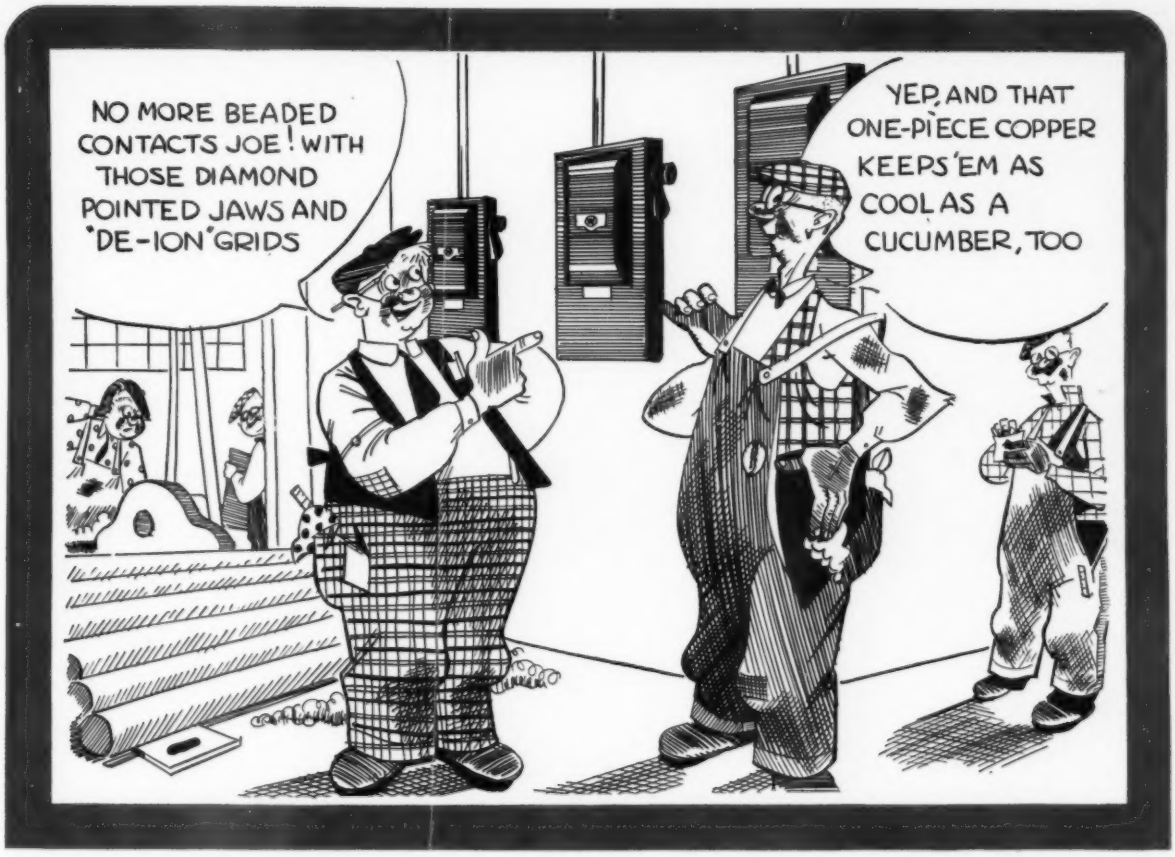
Quench tanks using water or oil are used in conjunction with some furnaces. Electric heating units can be applied to the tanks to maintain a uniform temperature of the quench.

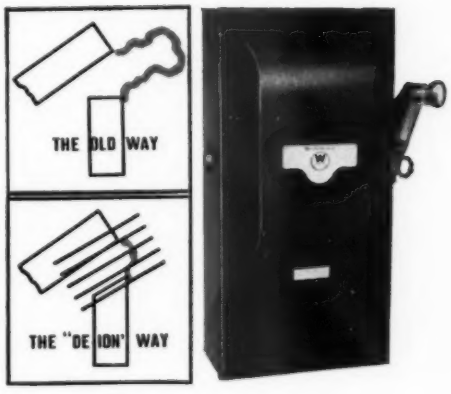
Maintenance—Furnaces to be kept in operating condition require a certain amount of attention. The following points should be checked:

1. See that voltage is reasonably close to nameplate rating.
2. On a definite schedule, check or replace thermocouples and inspect control instrument.
3. Keep contactor tips in good condition. Contactors open full line current many times per day.
4. Inspect connection between heating unit terminal and cable connector every six months.
5. Keep terminal outlets packed at outer wall. Air entering or escaping around terminals increases heat losses.
6. At regular intervals, inspect all furnace doors to insure that they are in good condition and sealed properly, so as to keep door heat losses to a minimum.
7. Carry spares for parts that may need replacement. A list of recommended spares can be obtained from the furnace manufacturer.
8. If the work is dirty or scales while in the furnace, periodically take up hearth plates and clean out all scale and dirt.
9. Hearth plate life will be increased by uniform loading and keeping thermal shock to the hearth plate to a minimum.
10. Have a small vent in the furnace to keep the hydrogen sulphide concentration within safe limits. Hydrogen sulphide is liberated from carburizing compounds and attacks high nickel alloys which are used for mechanical parts and heating units in the furnace.

Automatic *control* is invariably used for electrically heated ovens, furnaces and other equipment. The usual control is an indicating thermometer controller with a sensitive gas or mercury filled tube inserted at the point where temperature is to be maintained. In many installations the controller is a recording type which gives a permanent record of the performance of the equipment. The controller scale best suited for greatest accuracy should be selected, with the greater portion of the scale occupied by the working range of the oven, furnace or other equipment.

The subject of heat treating naturally is complicated by the infinite variety of conditions that are encountered in the work. So we have discussed it in its broader aspects. This background data on industrial heating equipment, however, reflects the basic principles underlying the special equipment also.


NO MORE BEADED CONTACTS JOE! WITH THOSE DIAMOND POINTED JAWS AND "DE-ION" GRIDS
YEP, AND THAT ONE-PIECE COPPER KEEPS 'EM AS COOL AS A CUCUMBER, TOO



In the past, arcs have been broken by "stretching." The "De-ion" quencher confines, divides and extinguishes arcs instantly — obviously preventing concentration of burning heat on contacts or arc barriers.

"DE-ION" GRIDS QUENCH DESTRUCTIVE ARCS

You won't be bothered with customer complaints about flashovers and burned contacts when you install Westinghouse Safety Switches with "De-ion" arc quenchers. The "De-ion" feature on all Westinghouse 575 and 600-volt switches gives positive protection by quenching arcs so fast that they can do no damage.

And years of trouble-free service are assured by these added Westinghouse features: Diamond pointed jaws and extended blades confine beading to points outside the contact areas — one-piece copper parts eliminate loose connections and keep contacts cool and tight.

Simplicity of construction makes Westinghouse Safety Switches easy to install. Parts completely visible, for easy inspection.

All commercial types and ratings available from your electrical wholesaler.

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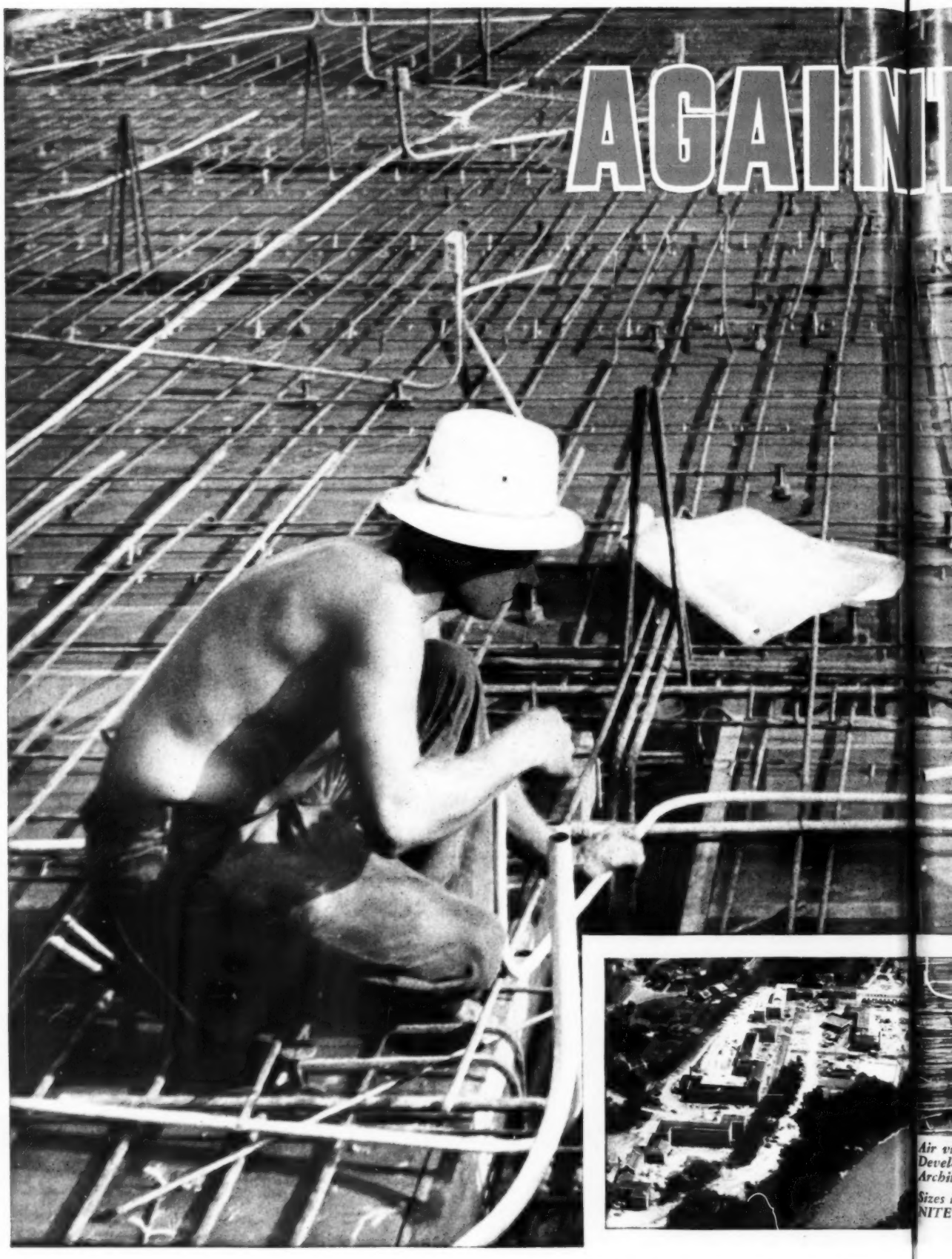
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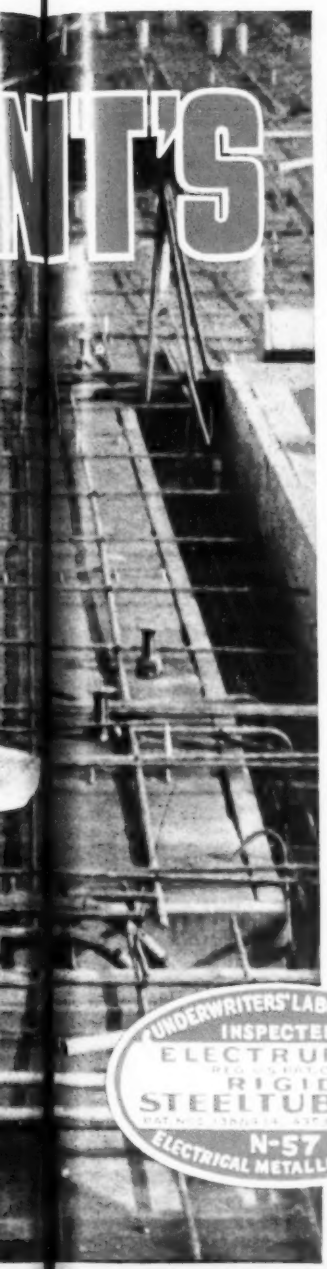


NT'S STEELTUBES!

in concrete

Here's another outstanding Steeltubes job in concrete—the Olentangy Village Housing Project, Columbus, Ohio.

After installing more than 160,000 feet of this modern threadless conduit on the job, the electrical contractor, The Miller Electric & Construction Co., had this to say about it:

"We found a decided saving in cost. The adaptability to special installations and the simplicity of fabricating are among the many outstanding advantages of this product. Wire pulling troubles are reduced to a minimum due to the smooth joints made by the connectors and couplings, and the uniformity of the bends, especially in the larger sizes. We approve this product for use in modern concrete construction."

Again and again, ELECTRUNITE Steeltubes is the raceway selected for wiring systems buried in concrete—because it's strong, safe, sound and so easy to handle and install. Use it for your next job—and see how it helps to increase your profits.

Look for this label. It is found only on genuine ELECTRUNITE Steeltubes.

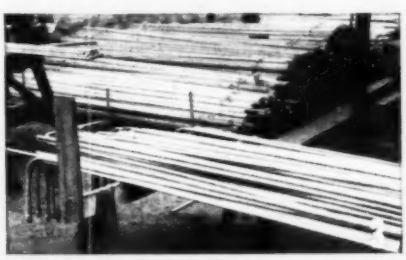
Steel and Tubes, *Inc.*

CLEVELAND . . . . OHIO

REG. U. S. PAT. OFF. SUBSIDIARY OF REPUBLIC STEEL CORPORATION

Air view of the six-million-dollar Olentangy Village Housing Development, Columbus, Ohio, which will house 1200 families. Architect: Raymond C. Snow, Washington, D. C.

Sizes in this installation ranged from ½ to 1¼ inch. ELECTRUNITE Steeltubes is available in seven sizes—⅜ to 2 inch.



3. *It's easy to make neat, smooth, uniform bends with ELECTRUNITE Steeltubes. These were pre-fabricated on the job.*

4. *After concrete is poured and the job is ready for wiring, you'll enjoy another advantage of ELECTRUNITE Steeltubes—it's ease of wiring.*

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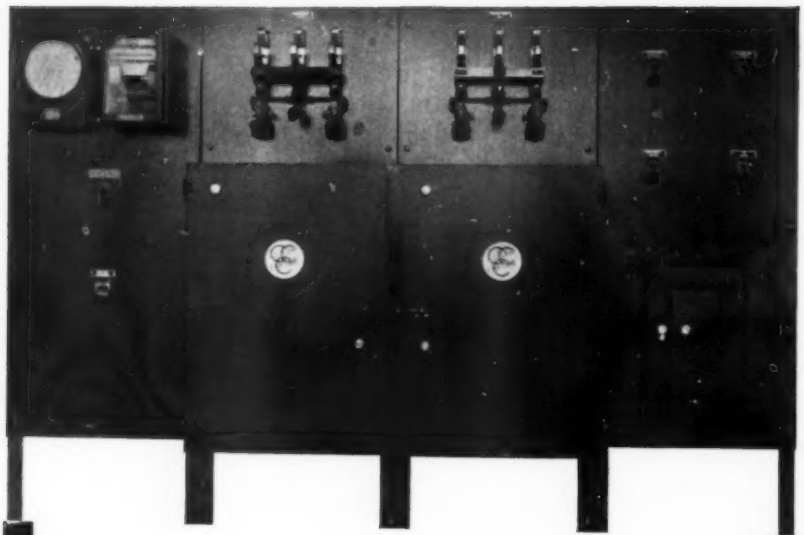

DEAD FRONT SEWAGE PLANT CONTROL PANELS

In an Eastern Sewage Treatment Plant, this 4 panel "3C" Dead Front Control Board provides effective control and protection for 6 motors.

There's an incoming power panel, two controls for 15 H.P. wound rotor sewage pump motors, and a distribution panel for two comminutor motors, one fan motor, one sump pump motor, and station lights.

The equipment is completely controlled by Float Switches, and provides phase failure and high level protection with the addition of audible and visual signals.

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Immersion Heater Solves Putty Problem

To keep putty in a workable condition was a problem at the plant of the Morgan Sash and Door Company, Chicago, until an electric immersion heating unit was put to work. Both electric wire-coils and fuel were tried. They were applied outside the tank but the results proved unsatisfactory. Furthermore, the putty tended to heat only on the bottom of the container, with the result that part of it dried and the remainder was cool.

A special, double-walled tank is used

PUTTY is kept in a workable condition by an electric immersion heater.

to hold the putty. The space between the walls of this tank is filled with water, and a 4-kw. immersion heater raises the water to the correct temperature. Now no trouble is experienced in keeping a full 50-lb. batch of putty in condition for immediate use. Also fire hazard is eliminated and heat losses have been reduced.

Plywood Patching Costs 80% Less

One of the problems in the manufacture and marketing of plywood is to cut down the proportion of absolute "rejects". While a surface veneer which must be patched cannot go through to meet No. 1 specifications, for many practical purposes small patches may be made without marring the attractiveness of the average veneer grain. If this patching can be done with speed as well as accuracy, there is a tremendous saving in output that helps insure maximum earning capacity for the mill.

Chipping out a sappy or other bad spot in the plywood surface is tedious work when done by hand. A standard sized pattern for the gouge must be marked on the wood; care must be ex-

ercised not to cut through the board. Fitting in the patch calls for more hand work, before glueing.

With a production up to 60,000 sq. ft. per day, one man does the work of

***ROUTING OUT** bad spots in plywood surface. Cutting tools driven by V-belt and ¾ hp., 3,600 r.p.m. motor.*

ten by our method of cutting out bad spots with special routing machines. We operate two when running at capacity. These are suspended on a trunnion frame, with springs which permit the easy dipping of the mechanism to the surface of the plywood to be patched. There is also enough lateral play of the reaming tool through this suspension, to permit free control by the operator. The exact size of the patch is pre-determined, then a guide-plate is shifted to position and locked with a lever mechanism. Even with the increase in cost of employing two men constantly on the band-saw bench, cutting patches to be applied with hot glue, the process as a whole saves 80 per cent over the tedious manual operation formerly used. (*From William Miller, Supt., Veneer Plant Division, Elliott Bay Lumber Co., Seattle, Wash.*)

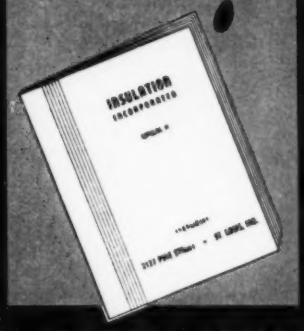
Electrical Safeguards in a Strip Mill

Practically all equipment is electrically operated in the new 96-in. continuous strip mill of Jones & Laughlin Steel Corp. Safety was an important consideration.

Throughout the mill, the average employee is not exposed to high voltage. Wherever manual control is necessary on the 440-volt circuits, control transformers reduce power to 220 volts at the push buttons. Circuits are arranged so that they can be locked open when repairs are necessary.

Towers which support the electric cables from the power plant have been designed with a partition in the center. By this arrangement electricians can work on the dead side of the line with-

SEND FOR YOUR COPY



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If you are not one of that great army and taking advantage of this modern, dependable service, see how you too can benefit by having an Insulation Incorporated Catalog and by using it.

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P-300 MOTOR LEAD WIRE

For small motor usage where a baking varnish is used. Tinned, Copper, Paper Separator, Special Rubber Compound to resist Baking Fatigue—Single Braid Cotton, Heat Resisting Lacquer Finish. Furnished on spools. Sizes 18 and 16 furnished in black, green, red, and yellow. Other sizes black only.

FIBRE

Taylor Fibre Company products are outstanding in quality—when you need Fishpaper, fibre rods, fibre tubing, laminated phenol fibre, or phenol fibre round tubing—here is your answer.

MAGNET WIRE

We handle Essex wire—drawn and rolled from the best grade Electrolytic Copper rod stock. A complete stock of round and square magnet wire kept in stock. Rectangular sizes shipped from our Detroit factory just as promptly.

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Standard or commercial—automotive—refrigerator, Century, Delco, Wagner. All products of merit, nationally-known, widely used. When you need commutators we have the right quality.

A Merry Christmas and a Happy New Year

We thank our customers for their loyal support during the past year and we are glad that our one stop, immediate service for repair shop requirements has been of such benefit to you. Our best wishes for your greater prosperity.

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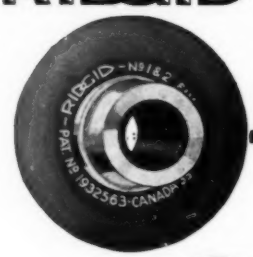
This new blade-type RIDGID cutter wheel assures you *quick, clean, low cost pipe cutting*



● Like the blade of a good knife, this RIDGID cutter wheel blade is made of fine tool steel—for more cutting power and stamina. Where ordinary wheels are cut from bar stock, RIDGIDS are coined from tool steel sheets, hammered, heat-treated and cast into a solid hub. Many more cuts per wheel, quicker cutting, practically no burr . . . And thousands of users will tell you that this steel reinforced cutter, guaranteed not to break or warp, always cuts true, twirls easily to size, stands the gaff of hard use. For a tool a good workman can take pride in, for speedier better work and less cutter wheel expense, buy the RIDGID. Ask your Supply House—today.

THE RIDGE TOOL CO., ELYRIA, O.

RIDGID PIPE TOOLS

out making contact with the line circuits.

Overhead electric cranes for transporting heavy loads (as much as 75 tons) have extra brakes on the jack shafts, in addition to brakes on the motor shafts. This provides additional protection to equipment and workmen.

Enameled Pipe Inspected at Lower Cost

Harry Hayes in the Field Engineering Laboratories of the Water Department of the City of Los Angeles, was confronted with the problem of inspecting approximately 13,000 ft. of 24- and 36-in. enameled steel pipe during the processes of manufacture. He calculated that each 30-ft. section of 36-in. pipe represented about 570 sq. ft. of surface, counting both inside and outside areas. The specifications called for an enamel thickness between the

***HOW THICK?**—Enamel film is not patched and time is saved in testing enamel thickness on steel pipe, by use of an electromagnetic gauge.*

limits of 100 to 150 mills inside and 80 to 120 mills outside. His job was to see that every square foot of pipe produced was enameled to these tolerances.

Mr. Hayes considered the conventional method of stripping and micrometering samples of enamel at random. He did not like the idea. It would prove the thickness of only the actual sample taken, possibly one square inch. The number of samples which could be taken from each section of pipe was limited. At best only a few square inches of enamel could be checked on a section of pipe involving as much as 82,000 sq. in. Each sample taken meant a patch and the whole process was slow and costly. Mr. Hayes thought there must be a better way.

In a technical magazine Mr. Hayes noticed an article about the use of an electromagnetic thickness gauge for measuring without destroying the enamel coating on refrigerator cabinets. It was a far cry from a glistening white

enamel refrigerator cabinet to a 36-in. steel pipe coated with black coal tar enamel. With his imagination Mr. Hayes spanned the gap.

A thickness gauge was adjusted to meet the problem. It has been possible to measure almost continuously the enamel thickness of each section of pipe. As the newly enameled pipe rotates in the special enameling centers the inspector walks slowly along the pipe holding the sensitive "head" against the rotating pipe, and the instrument in his hand gives him a continuous indication of enamel thickness.

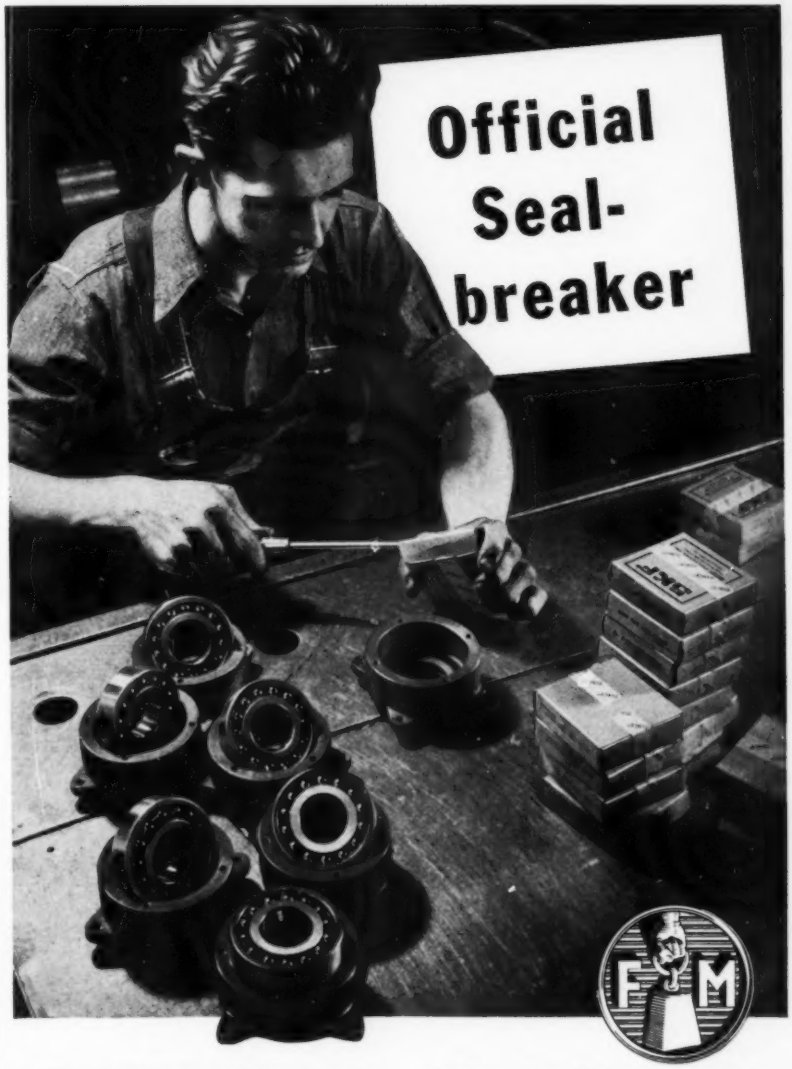
And so, it is now possible to literally take thousands of readings of the enamel thickness on every pipe section, without destroying the film or wasting time. Through this close and accurate method of measurement the fabricator has been able to improve his technique and produce a more uniform coating, and the City of Los Angeles has been able to do a better inspecting job for less cost. (*From G. F. Maughmer, General Electric Company, Los Angeles*)

Vibration Reduced Lamp Life Prolonged

Here is another way in which lamp life has been prolonged by reducing vibration in the conduit runs suspended from roof trusses. Watson Turner, an electrical maintenance man for an oil company in Texas, devised the method.

In a compressor room, the conduits carrying the lighting circuits were wired tightly at the center of the cross member of alternate roof trusses. The exhaust pipes from the twin-cylinder

SHOCK-ABSORBING MEDIUM *provided by screendoor springs for conduit suspended below roof members. Building is subject to jarring or heavy vibration.*



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These precautions are typical of F-M precision in every process of motor building. That's why F-M motors serve you long and well.

Fairbanks, Morse & Co., Dept. 24, 600 South Michigan Avenue, Chicago, Ill. 35 branches at your service throughout the United States.

When it's even too hot for a Hottentot, *COMFORTIZE* with Fairbanks-Morse air conditioners.

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TORCHES and SOLDERING IRONS

These torches and soldering irons supply proper heat for neat, rapid, economical installation of wire and cable. The torches, for open-flame work, produce instantly a concentrated, exactly controlled flame of high temperature. The soldering irons, for enclosed-flame work, can be kept constantly at a desired heat.

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Your jobber will demonstrate Prest-O-Lite Torches and Soldering Irons. Call him—or write the Linde office near you.

The word "Prest-O-Lite" used herein is a registered trade-mark.

THE LINDE AIR PRODUCTS COMPANY
Unit of
Union Carbide and Carbon Corporation
New York and UCC Principal Cities
In Canada:
Dominion Oxygen Co., Limited, Toronto

gasoline engines were carried through the roof to mufflers supported on the same roof members. As a result, some of the lights hardly got hot before the pounding jar shattered the filament. And, using 200-watt inside frosted bulbs, the cost jumped.

To eliminate the vibration transmitted through the conduit to the lamps, six dozen screendoor springs were used as supports. They were looped around the conduit and over the roof trusses. When the tight wires were cut, the entire conduit assembly dropped and was carried on the spring loops. Not a single rigid contact with the building existed.

The first month's saving of replacement bulbs paid for the screendoor springs used. A profit was made in the subsequent months.

Signals for Crane Operators

Where two or more cranes are operated on one runway, it may be difficult for one operator to know if another crane is in use. To meet such a condition and as a protection for the crane operators, one company has installed red and green lights on the outside of the crane cabs.

If the green light burns, it is an indication that the craneman is in the cab operating the crane. If the red light burns, it indicates that the main switch is open and the craneman has left the cab. Another operator will know that the crane with the red light should not be moved until the whereabouts of the craneman is ascertained.

New Plant Minimum Lighting

In each department of the new 96-in. continuous strip mill of Jones & Laughlin Steel Corp., the average light in foot-candles is—hot mill finishing, 12.5; plate finshing and shears, 12.2; blue annealing, 8.0; slab yard chipping, 30.0; roll shop, 9.5; cold rolling, 10.8; cold mill finishing, 12.0; cold mill shipping, 9.1. For certain finishing and inspection operations, special lighting is provided. The American Standards Code of Lighting Factories, Mills, and Other Work Places was used as a guide for the minimum amount of light to be furnished in the several departments and for the various operations.

This modern installation of lighting in a large plant will serve as an example for electrical maintenance men of smaller plants—how to use good lighting for safety and as an aid in production.

FILL ALL YOUR COMMUTATOR NEEDS . . .

Easily, quickly and dependably from these
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Regardless of your location or requirements, Homer can give you the commutator service you're looking for. Designed by experienced commutator engineers and stocked in eight key cities, you are assured complete satisfaction and speedy delivery.

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B-M CONNECTORS and COUPLINGS

No lost time or complicated installation troubles with B-M Connectors and Couplings—that's the reason for their popularity with so many contractors. Just two squeezes on the handles of the B-M Indenter and the B-M Connector or Coupling is securely fastened to the Electrical Metallic Tubing. You save enough on your first job to pay for the B-M Indenter.

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TRIANGLE CONDUIT & CABLE CO. Elmhurst, New York City

TELESCOPE BM SYSTEM

BRIEGEL METHOD TOOL CO.
Not Incorporated
GALVA, ILLINOIS

Making Dual Ovens Automatic

[FROM PAGE 10]

heating system continues to operate as long as the thermostatic switch of either oven calls for more heat.

With both ovens in use, the heating system runs for about three minutes and usually remains shut off for 5 minutes. Over-night operations are controlled by a master time switch, which shuts off the entire system at any desired hour. Usually the oven is automatically turned on again during the early morning hours to be in full operation when work is resumed in the shop.

Each oven has a small transfer switch beside the thermostatic switch, this providing "hand" and "automatic" switch

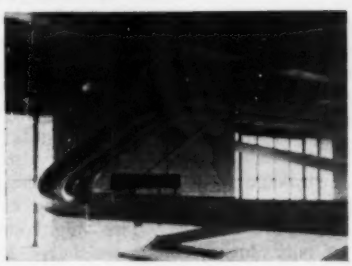
CONTROL CENTER *for both ovens includes relays controlling—(a) magnetic starter for 1 h.p. blower motor, (b) relays for gas valve and (c) duct damper solenoids. The time switch provides master control to stop and start the system at weekend periods or during the night.*

positions. The hand controls are used, if an oven is to be tested, or if special thermostat readings are desired without shutting off the oven controls. When the doors of either oven are opened, door switch contacts open the control relay circuit, shutting off the heat flow to that oven. This does not shut off the heating system if the other oven is using heat.

With this new automatic equipment, this modern shop's production routine is more flexible. Moreover the operation of dual ovens permits several classes of work to go on without interference or delay. And it all takes place according to the schedules and temperatures selected, without the need of periodic adjustments.

Photographic Proof-

OF ALL THE ADVANTAGES WE'VE CLAIMED FOR THE NEW CLEVELAND CONDUIT HANGER!



● Fewer units to handle . . . ability to pre-assemble conduit in loose clamps for better alignment . . . quicker, easier tightening with but a single screw . . . opportunity to hang parallel groups on one rail . . . ability to handle any wiring job without extra fittings, temporary work, etc! These are some of the many advantages we've promised you with the new *Cleveland Conduit Hanger.*

So far, however, you have had to take *our* word for it! But, *here* we give you photographic *proof* of the kind of finished job the *Cleveland Conduit Hanger* has given a leading contractor on a recent municipal power plant installation.

Study these three views . . . see how much *neater* they look; how much more *rigidly* the conduit hangs; how much *easier* it must have been to make the installation with rails and clamps all set up, ready to receive the conduit with but one screw to tighten on each clamp. Accommodating various sizes of conduit on a single rail, and permitting suspension or fastening direct to beams, you've got the most flexible layout you could ask for.

Cleveland conduit hanging equipment gives you everything you need . . . channels, rails and clamps . . . and there are *no extras!* Sounds good? Let us send you all the details!

Write Today...

for full information on this innovation in conduit hanging . . . and its economical, efficient use in making your work more profitable!

THE CLEVELAND SWITCHBOARD CO.

2927 EAST 79th STREET CLEVELAND, OHIO

UMI

Questions ON THE Code

Answered by
F. N. M. SQUIRES
Chief Inspector New York Board of Fire Underwriters

Boxes With Non-Metallic Cable

Q. *"Is it necessary to put an outlet box in ceiling when non-metallic sheath cable is used, or can connection be made under canopy? Out here the practice has been to come thru plaster with loom over wire and go directly into rosette or where fixture has canopy, to conect under canopy.*—BFR."

A. The Code is quite definite on this in Section 3014 which requires that: "A box shall be installed at each outlet, switch, or junction point of conduit, electrical metallic tubing, surface metal raceway, armored cable, or *non-metallic sheathed cable*, and at each outlet and switch point of concealed knob and tube work."

Note that this last clause permits junctions to be made in concealed knob and tube work within the walls, concealed, and not in boxes. Then note that Section 3014 goes on to say that: "Boxes used at outlets for fixtures shall be designed for the purpose" and "At every outlet used exclusively for lighting the box shall be so designed or installed that a fixture may be attached."

It will seem therefore, that the practice indicated in the above question is not in accordance with the Code but that an outlet box must be installed at each outlet.

Grounding in Outbuildings

Q. *"I would like the following information: A garage wired with BX cable having a metal panel box which is grounded to a ¾" galv. iron pipe driven eight feet in the ground, and connected to a No. 8/1 BX cable. At certain times customer would get a shock by touching the panel box. He had an electrical engineer go over the wiring who connected the ground to the neutral at the panel.*

"Doesn't this violate section 2562?

"The house service is properly grounded at the service entrance to the water pipe. The garage is fed from house by a 20 ft. aerial span.—F.H.A."

A. As the garage is fed by an overhead line from the house, the grounding of the neutral in the garage is permissible under Section 2536 of the National Electrical Code, providing both the neutral and the box are grounded to earth. But the condition which leads to the panel in the garage being "hot" at certain times should be investigated.

While this condition might be due to induction, there might also be a leakage from the live leg of the garage wiring to the armor of the cable or metal of boxes. This might show up only during damp weather. But the condition should be corrected.

If the trouble is due to induction then the remedy is the grounding of the neutral to earth as well as to the metal of the panel box.

MICHIGAN INSPECTORS *discuss the formation of a Michigan Chapter of IAEI. Field Engineer Lloyd J. Branch and Chief Inspector A. T. Babbitt of the Michigan Electrical Administrative Board study the petition to be presented by Lester R. Strain of Grand Rapids, temporary Chairman of the new group.*

Conduit for Leaded Wires

Q. *"With reference to the installation of lead-covered cables in rigid conduit, we would be pleased to have your opinion as to whether or not the installation of short runs of three No. 14 duplex, and one single-conductor lead cables in 1-inch conduit would be in compliance with the Code. Table 4 gives the size of raceway for number of single-two and three-conductor cables, while Table 5 gives Percentage of Cross-Sectional Area of Conduit or Tubing where a combination of cables are installed; but arriving at the cross-sectional area of a duplex conductor appears to be always in doubt.*

According to the Wire Sheets of Hazard and also National Electrical Products Co., the approximate o.d. of No. 14 solid, twin conductor rubber and lead Code wire and cable is given as .25 × .44."—**J. P. M.**

A. The Code furnishes only partial aid in settling the above problem. While Table 7, of Chapter 9, gives the dimensions of single lead-covered wire, a table giving dimensions of lead duplex would also be of great help, as probably lead duplex is used to a greater extent than lead single. But the dimensions of the two manufacturers mentioned above are probably quite accurate. As lead duplex wire is in the form of an elipse, we will, therefore, use the figures given as the major and minor axes in computing the cross-sectional area of No. 14 lead duplex. Using the formula—

$$\text{Area (of elipse)} = \frac{\pi}{4} Dd$$

or, substituting values above =

$$\frac{3.1416}{4} \times .44 \times .25 = .0864$$

3 such lead duplex—
plus 1 No. 14 lead—3 × .0864 = .2592
.0491

Cross-sectional area of all wires involved = .3083
Area of 1-in. conduit = .86
Using factor from Table 5,—
.86 × .35 = .3010

From this we find that the area of the 1-inch conduit is but .0073 shy of being large enough. In view of the fact that the over-all measurement of the lead duplex wire is probably not accurate, and since the run of conduit is short, we would probably encounter no difficulty in using three No. 14 lead duplex and one No. 14 single lead wires in a 1-in. conduit for a short run.

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

Output Resumes Its Rise

Continues above 1936—Catching up with 1937—New England recovers—Gains are general

With the production of 2,182,751,000 kw.-hr. in the week ended October 15, according to the Edison Electric Institute, the output curve of the electric light and power industry resumed the upward trend that had been interrupted during the three preceding weeks. The output was the largest for any week thus far in 1938 with the single exception of the week following Labor day. With the same exception, also, it approached most nearly to the output a year ago, the disparity being cut to 4.1 per cent. The increase restored the lead over 1936 which has characterized the operations of the past half y

The outstanding f
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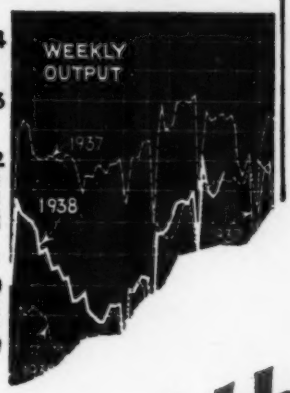
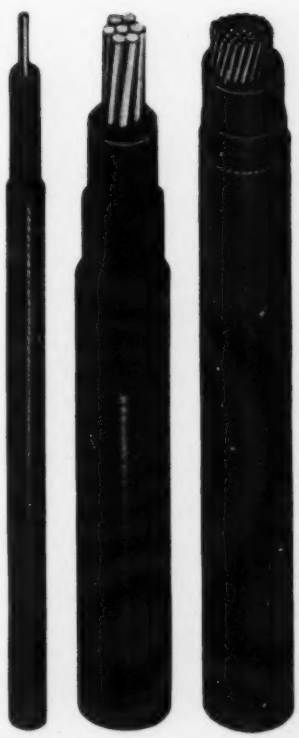


Reprint
Electrical World
Oct. 22, 1938

NOW-more than ever SELL ADEQUATE WIRING

STEADILY INCREASING OUTPUT DEMANDS IT

Seldom has such an opportunity for increased revenue been presented. You may have to wear out a little more shoe leather—or a little more mileage off your tires—but it's worth the extra effort. Large and small users alike are anxious to learn how to stop waste and inefficiency caused by obsolete and inadequate wiring. YOU are the man to advise them. Our nationwide organization of sales-engineers offer their services in helping you survey the wire and cable needs of your customers.



CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY

CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER PROOF WIRE

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In the News

LEAGUE MEN DISCUSS WIRING

League managers are showing a growing keen interest in the wiring market. This stood out in the third annual conference of the International Association of Electrical Leagues in Philadelphia, Nov. 17, 18. League men from coast to coast came there for two days of close work. George C. Conover of the Philadelphia association presided.

H. P. Liversidge, president of the Philadelphia Electric Company, himself a league builder when former president of the Philadelphia group, laid down the keynote. He said that great harm has been done in the electrical industry by one interest getting in another's way. Real progress can only be made when each branch does its own work freely and in coordination with the rest. He looks to local associations to prevent these conflicts in future.

W. E. Sprackling, C. A. Eastman and G. E. Whitwell, chairmen of the Adequate Wiring, Better Light-Better Sight and Modern Kitchen bureaus, presented their programs to the league men and asked for local support and leadership. Other speakers were S. G. Hibben and D. S. Stophlet of Westinghouse, C. L. Ripley of General Electric and G. W. Allison of Edison Electric Institute.

At least half the conference was devoted to working problems of the league managers. The following officers were elected for the coming year.

A. A. Gray, Chicago, president; G. W. Weston, Kansas City, vice-president; J. W. Bartlett, Washington, treasurer and O. C. Small, NEMA, secretary.

CHICAGO HOSTS TO WHOLESALERS

Members of the Chicago area electrical wholesaling fraternity were the guests of the Cook County Electrical Contractors Association in a good-will dinner at the Sherman Hotel in Chicago on October 24 with 70 electrical contractors and wholesalers attending.

Elton Gould, President of the Association urged the wholesalers to set up a committee to work with a contractors committee in establishing adequate differentials in the price structure of electrical materials for the protection of the electrical contracting industry.

"List prices available to customers," said Mr. Gould, "do not provide the contractor with sufficient margin to conduct his business, and place him in a position of appearing to overcharge the customer when he presents his bill." A correction of these and many other problems, he said, requires closer cooperation between electrical contractors and wholesalers. The wholesalers pledged cooperation.

HEPLER ON LABOR COMMITTEE

The special mail ballot in Washington, Oregon, Idaho, Montana, Wyoming and Utah, elected S. G. Hepler of Seattle, a member of the NECA Labor Relations Committee to succeed R. C. Kenney of Portland.

With this election the NECA Labor Relations Committee personnel is now completed with the following membership: E. C. Carlson, Youngstown, Chairman; C. L. Chamblin, San Francisco, Vice-Chairman; A. L. Bush, New York City, Secretary; H. T. Cole, Boston; J. R. Williams, Pittsburgh; D. B. Clayton, Birmingham; J. N. Pierce, Chicago; H. C. Evans, Kansas City; M. E. Hart, New Orleans; S. G. Hepler, Seattle; G. W. Patterson, Toronto.

FOR MODEL STATE LAW

The special committee for drafting a model state electrical law met in Chicago during the week of November 28th. L. P. Dendel of Lansing, Mich., is chairman of this committee. George Andrae of Milwaukee is the NECA representative. Eight other members are on the committee representing the inspection and insurance interests, Edison Electric Institute, National Electrical Manufacturers Association, U. S. Conference of Mayors, Rural Electrification Administration, U. S. Department of Agriculture and National Fire Waste Council. Principles regarding state legislation for electrical inspection and electrical licensing will be developed.

SWOPE TALKS ON LABOR

Speaking before the National Electrical Manufacturers Association at its recent meeting in Chicago, Gerard Swope, president of the General Electric Co., described industrial relations in Great Britain and Sweden. He was a member of the Committee sent by President Roosevelt to study conditions in these two countries. "In Britain," he said, "an employers federation makes national agreements on labor problems with 41 unions, who meet together in one committee to negotiate with the Federation of Employers in all important matters.

"A comprehensive agreement was made in 1898 between the electrical industry and the union, settling all matters of dispute and creating negotiating machinery. The wage structure in the industry consists of both time and piece rates. Wages are fixed regionally but general increases or decreases are usually determined nationally. All national wage adjustments have been made by flat additions to or subtractions from previous additions to the basic time rate.

"There is also a cost of living bonus of so much per week, depending upon the cost of living indices published by the

COOPERATION between the wholesalers and contractors was pledged at a dinner of the Cook County Electrical Contractors Association in Chicago. At the speaker's table, reading from left to right, are: A. J. McGivern, Chicago Electrical Wholesalers Association, Herbert Binner, Elton Gould, Cook County Electrical Contractors Association and Sam Rosenthal, Chicago Electrical Wholesalers Association.

THE UNSEEN HAND

THAT MAKES THIS TYPE INSTALLATION COMPLETELY AUTOMATIC

Sterling Reflector Photo

Today's trend in lighting effects for store fronts is toward bright illumination. Obviously, store owners must receive dividends from these modern installations or they wouldn't invest their money in them.

Not all store owners can completely remodel their store fronts, but they can (and will, if you tell them) modernize the lighting in their display windows. Then, with a Sangamo Time-Switch to see that the lights are used regularly and punctually—they, too, will reap the extra profits which come from increased window circulation.

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

UMI

[FROM PAGE 42]

Ministry of Labor. These basic time rates are determined by agreements between the union and the local associations, who are members of the National Federation. A tendency is to deal with labor rates nationally and to avoid changes affecting only a portion of the industry or a particular area.

"Hours and over-time rates are also determined nationally. The working week was fixed at 47 hours in 1918 and has not since been altered. A weeks vacation with pay was provided by voluntary national agreement in 1937. The general policy is to have no contractual closed shop, and therefore no check-off. The employers favor union membership but no discrimination is made."

VIRGINIA CONTRACTORS ORGANIZING

Approximately 100 electrical contractors throughout Virginia have been enrolled for the organization of the Virginia Electrical Contractors Association. This comes as the result of two months of field work by NECA Representative J. H. Dyer. Plans have been made for the holding of the first State Association convention in Richmond early in December. Officers will be elected and a program set up, embracing a bill in the next Virginia legislature for state licensing of electrical contractors.

ATLANTA LICENSE BREAKS DOWN

Superior Judge John D. Humphries in the Georgia Supreme Court late in October declared unconstitutional Atlanta's 25 year old ordinance requiring electrical contractors to pass examinations on their technical skill. A mandamus suit was brought by C. N. Coker, seeking to require the city to grant him a license and inspect his work without the required examination. Judge Humphries held the ordinance discriminatory, inasmuch as under its provision electrical contractors could stand the examinations, then employ unexamined workers.

GROUNDING OF PORTABLE EQUIPMENT

The technical sub-committee of the Electrical Committee, N.F.P.A., on the grounding of portable equipment, including motors, met in New York City on November 16th. W. R. Bullard of Ebasco Service Company, is Chairman, and Robert E. Denike of the contracting firm of the same name, New York City, is the NECA representative.

Mr. Denike submitted to the technical sub-committee records of nearly fifty electrical accidents which have occurred in the past year as the result of improperly grounded portable electric tools and equipment, many of them resulting in death. The study of electrical hazards growing out of improperly grounded portable equipment was referred to this technical subcommittee at the request of NECA following a fatal accident in Miami, Florida.

"I have to wear 'em boss, the slightest shock upsets me."

HALF AND HALF HOUSE

A Spokane contractor co-operated through the local Adequate Wiring Bureau and the Chamber of Commerce in a Half-and-Half House demonstration. An old style house was half modernized to show the contrast between antiquated and

HALF AND HALF—This Spokane house has been half modernized throughout, to show the contrast room by room.

modern equipment, room by room. Good lighting, a bathroom heater, plug in strip, kitchen exhaust, multi-breaker distribution, and mushroom lights over sidewalk steps were installed.

The contractor furnished the labor at cost. The Bureau donated the materials. The result was a striking exhibit of what can be done to rejuvenate an old home.

WHAT A-W CITIES ARE DOING

Within nine months since the National Adequate Wiring Program was launched, approximately 150 active local wiring promotions have been set up throughout the country. Meanwhile, national headquarters has corresponded with more than 400 interested cities and towns located in 46 states. Here are highlights of recent activities in various sections—

Dallas—Special display and demonstration panels showing the advantages of adequate wiring and the false economy of skimpy wiring were used at a recent Home Show. Individual No. 14, 12 and 10 circuits were connected with a meter calibrated to show wattage losses.

Cleveland—A recent survey shows that more than 3000 Cleveland families are immediate prospects for re-wiring jobs, with a total value of $70,000. Re-wiring jobs in prospect indicate an average cost of $22.81 per home.

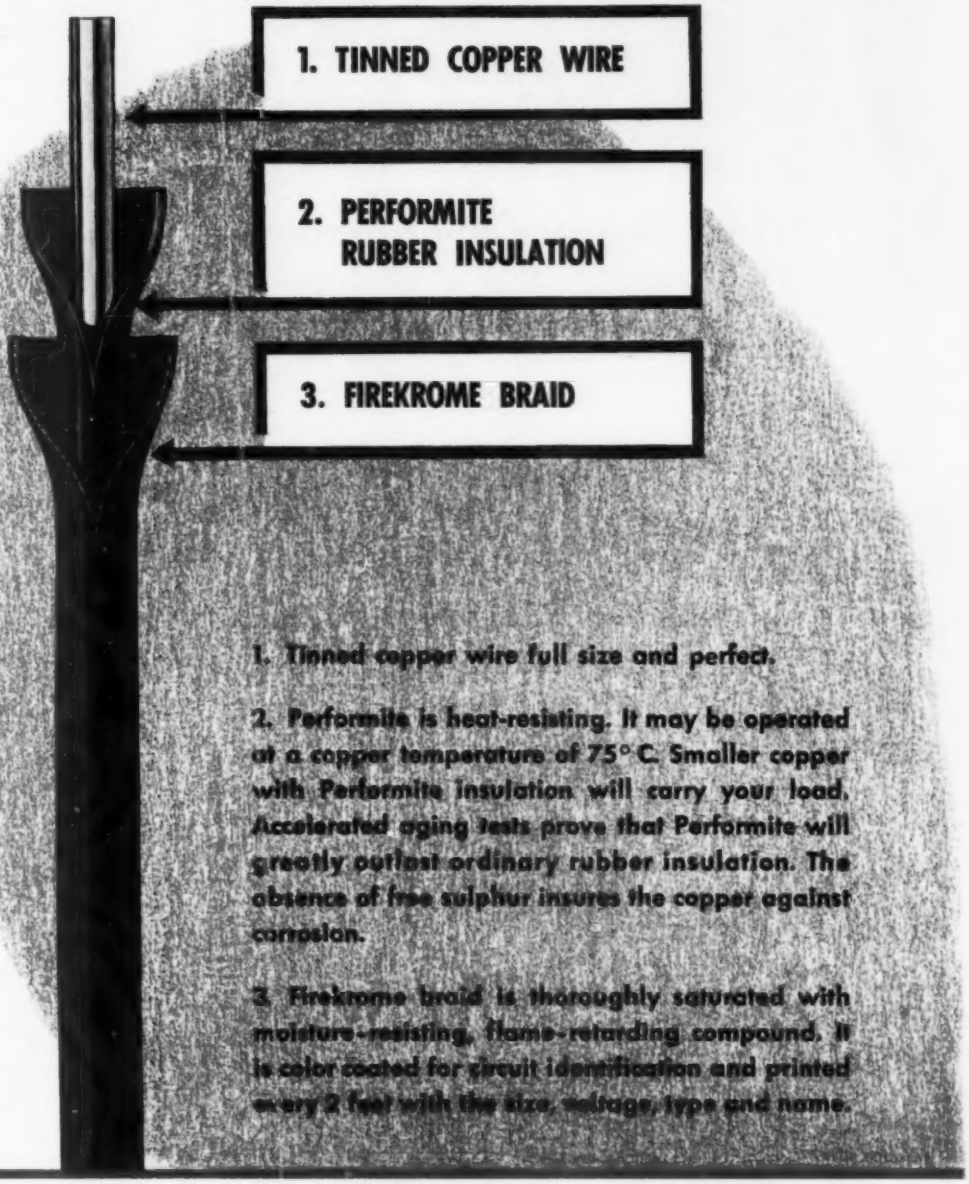
Akron-Richmond—Formal applications to operate the certification plan have been received from the local Adequate Wiring Bureaus.

Youngstown—An Adequate Wiring Bureau has been organized under the sponsorship of the Electrical League.

Memphis—Since June, five new homes have been certified and 64 applications are pending for certification.

Pennsylvania—More than 400 contractors in territory served by the West Penn

The INSIDE STORY *of*
PERFORMITE WIRE



1. Tinned copper wire full size and perfect.

2. Performite is heat-resisting. It may be operated at a copper temperature of 75° C. Smaller copper with Performite insulation will carry your load. Accelerated aging tests prove that Performite will greatly outlast ordinary rubber insulation. The absence of free sulphur insures the copper against corrosion.

3. Firekrome braid is thoroughly saturated with moisture-resisting, flame-retarding compound. It is color coated for circuit identification and printed every 2 feet with the size, voltage, type and name.

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

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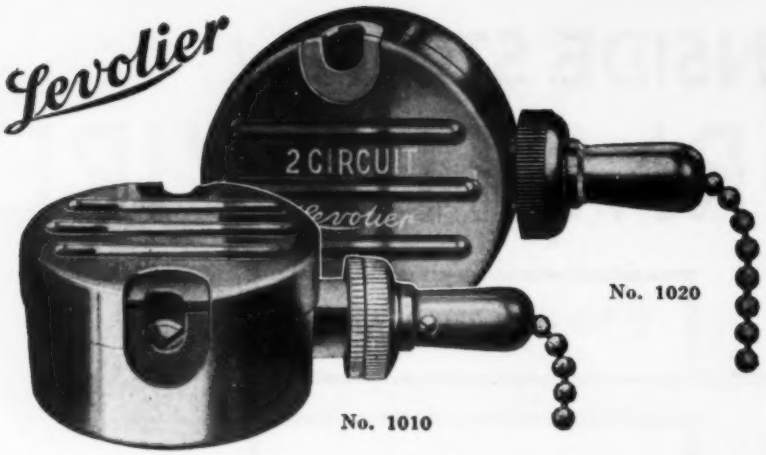

Two 10-Amp. Switches You'll Appreciate

The LEVOLIER Switch No. 1010 (125 volts) is designed purposely to control high watt, high intensity lamps from the fixture canopy, or conduit box. Listed by Underwriters' with "T" rating signifying under test it had 12,000 more pulls with initial surge of 80 amps — 8 times its rated capacity. Choice of three finishes, with plain lever, chain lever, or 7' cord with bell at end.

The LEVOLIER No. 1020 is a two-circuit switch (125 volts) made especially for controlling two-filament, three-light lamps. Up to 1250 combined wattage. First pull on the lever lights the small filament. Second pull turns it off, lights large filament. Third pull relights the smaller causing both to burn. Fourth pull turns both off. Adaptable to every type of installation.

McGILL MANUFACTURING COMPANY
Box 670, Valparaiso, Indiana

In the News

[FROM PAGE 44]

Power Company are receiving an adequate wiring prospectus designed to enable contractors to increase their profits by "switching from price to profit selling."

Milwaukee—In four months the field staff of the Electrical League of Milwaukee has prepared 52 plans. Fifteen homes are approaching certification.

Los Angeles—Certificates have been issued to 50 owners of new homes in Los Angeles, Burbank, Glendale, Pasadena, San Pedro and other nearby communities.

Cincinnati—Recent certification of six homes in the $9,000 cost bracket, erected by a local builder, will be advertised to acquaint the public with adequate wiring. Red Seal staff workers are discussing wiring plans with architects, builders and persons taking out permits for new homes. During the past 18 months 831 plans were checked, 617 recommendations were accepted; 5342 lighting outlets, 4304 switch outlets, 6436 convenience outlets were installed.

Promotional and direct mail campaigns and special display are under way in—Birmingham, Indianapolis, Columbus, Miami and Jackson, Miss.

SO. CALIF. GOES AFTER HEAVY MODERNIZATION

NECA chapters have been organized recently in Santa Barbara, Pasadena, Pomona, Ventura, Los Angeles harbor district, and Riverside. Other chapters are in process of organization at Inglewood, Huntington Park, also a separate chapter for Los Angeles residential contractors.

The Electrical Development League of Southern California recently approved the contractors program for modernization of office and industrial buildings and will soon begin advertising the program. This was announced at the first fall meeting of the Los angeles NECA chapter, held on Oct. 10. Following reports from four chapter delegates who attended the NECA convention in Detroit, A. L. Stone, president of the chapter and executive committeeman for division 9, announced that Roy Gruendler had been appointed field man for that NECA division.

EXCESS APPRENTICES

Minnesota Electrical Council reports a shortage of journeymen and too many apprentices waiting for work. These youngsters have had an 18 months course of education and now want three years experience with journeymen. They are having trouble finding both, because of a scarcity of journeymen at work. The Council is trying to place them.

STRONG ADHESION

NON-RAVELING
STRAIGHT TEARING
HIGH TENSILE STRENGTH
HIGHLY INSULATING
STRONG ADHESION

Sticking to its job of providing permanent insulation wherever applied, SECURITY is the quality tape that lives up to its name. Not merely tacky, its adhesive compound is of the strong, rubbery type that sticks and holds. That's why "live wires" depend on Security . . . the quality tape.

UNITED STATES RUBBER COMPANY · US · TRADE MARK

SECURITY

United States Rubber Company

U. S. Rubber Products, Inc., New York, N. Y.

SECURITY BEYOND PRICE AND SPECIFICATIONS

ALSO U. S. ELECTRICAL WIRES AND CABLES, LINEMEN'S BLANKETS, SWITCHBOARD MATTING

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Badger

Synchronous
ELECTRIC
TIME
SWITCH

For Real Profit

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Complete dependability in operation is the quality that makes these Badger time switches really profitable for you. Wire 'em and forget 'em—they will give years of satisfactory service.

The complete Reliance line includes the BADGER, RELIANCE, RACINE and the MODEL W RELIANCE—a time switch for nearly every application. Write for full information.

RELIANCE AUTOMATIC LIGHTING COMPANY
1937 MEAD STREET
RACINE, WISCONSIN

For A. C. loads up to 50 amperes. Furnished in single and double pole types and in either cast iron or sheet steel cases. $18.00 and up. Underwriters' Laboratories approved.

★

"There's TESTED STRENGTH in EVERY LENGTH"

RIGID STEEL CONDUIT

Make a memorandum to use "CENTRAL" on your next job—the 12 point Rigid Steel Conduit that combines ALL the advantages of the perfect conduit including unusual wall thickness, greater tensile strength, balanced weight, standard threading, all of which give "CENTRAL" the maximum resistance to arcing, vibration or mechanical injury.

CENTRAL TUBE COMPANY
PITTSBURGH, PA.

In the News

[FROM PAGE 46]

COMING MEETINGS

National Electrical Manufacturers Association — Mid-Winter Conference, Waldorf-Astoria Hotel, New York, Feb. 5–10.

Florida Association of Electrical Contractors —Orlando, March 5–7.

RANGE PRICE INCLUDES WIRING

A departure from the direct subsidy for wiring electric ranges has been taken by the Electric Institute of Washington. The plan provides a standard wiring charge of $35 to be included in the established retail list price of the range. The new agreement was evolved after a court ruling of last January, which enjoined the Potomac Electric Power Company from contributing to the cost of range wiring. Previously a flat charge of $15 had been made for wiring installations.

Under the new plan the customer is quoted an installed list price, estimated to run about $47.30 for average jobs. Appliance retailers will receive a percentage of the wiring charge. In the District of Columbia the charge covers rigid conduit wiring as required by ordinance whereas in outlying territory the contractors may use service entrance cables.

NORTH CAROLINA LICENSE IN SECOND YEAR

The North Carolina Board of Examiners announces continued progress under the Electrical Contractors Licensing Law as it enters its second year of operation. To date, 229 class I, state-wide, and 446 class II, one county, licenses have been issued by the Board for 1938-1939. Licenses previously issued but not renewed for 1938-1939 number 31 class I and 78 class II licenses. The board indicated that, in most instances, those who did not renew were no longer engaged in the electrical contracting business or were employed by a licensed contractor.

BOOK REVIEWS

Residential Lighting Data

A book entitled "Handbook of Residential Lighting Practice" presents in simple, non-technical language a concise interpretation of the use of light in the home. The purpose of the book is to serve as a text book, as well as a manual for the training of those primarily engaged in home lighting work. It consists of a compilation of the best principles of lighting application, authoritatively discussed in understandable language with numerous photographs illustrating the most up-to-date lighting practice.

The ten chapters cover: light and vision; electrical and illumination terms; light sources; residential lighting equipment; portable floor and table lamps; period furniture and lamps; colored light and decorations in the home; home wiring; lighting the rooms of the home; and garden lighting. This volume gives the necessary information to prescribe correctly and with decorative taste for lighting the home.

New H & H BAKELITE COVER DEVICES for Outlet Boxes

THE SWITCHES are completely enclosed, with insulated base fastened to brown Bakelite cover. Mechanism has the sturdy, dependable action of the popular H & H "Residential Switches." Single-pole and 3-way types for 3½" and 4" boxes... Receptacles are Duplex only, for 3½" and 4" boxes. Attractively designed to "dress up" rural electrification jobs; styled equally well for urban work. Complete-line listings in catalog data sheet—on request.

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

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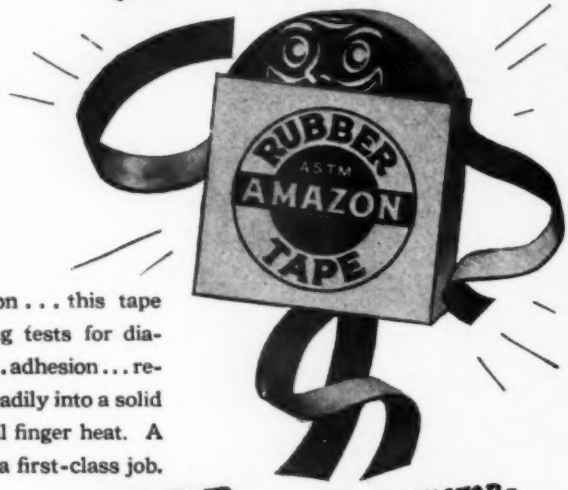
"I'VE PASSED ALL MY TESTS!"



For your protection . . . this tape undergoes searching tests for dielectric properties . . . adhesion . . . reliability. It forms readily into a solid mass, under normal finger heat. A first-class tape for a first-class job.

RUBBER TAPE AMAZON-VICTOR-

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OFFICES IN 85 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., NEW YORK

Always on the job . . .

TORK TIME SWITCHES
ALL-ELECTRIC

191 SP
1650 Watts
List $12.75

962 DP
4000 Watts
List $15.00

BUY through your JOBBER
Send for your copy of FREE BULLETIN

The TORK CLOCK CO., Inc.
Mount Vernon, New York

MINERALLAC HANGER

Conduit 3/8"—2 1/2"
Cable to 2 1/8" (with Bushings)

MINERALLAC JIFFY CLIP

Sizes from .250" O.D. Tubing to 1 1/4" conduit.

See your Jobber

New York City Office
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50 Church Street

MINERALLAC ELECTRIC CO.
25 N. Peoria St., CHICAGO

In the News

[FROM PAGE 48]

The author is Miss Myrtle Flahsbender, director of home lighting, Westinghouse Lamp Division. Copies are priced at $1.00 and may be obtained from any division or district office of the Westinghouse Lamp Division, Westinghouse Electric & Mfg. Co., or from 150 Broadway, New York, N. Y.

Data for the Coil Maker

A practical book—"Winding Alternating-Current Motor Coils," by G. A. Van Brunt and A. C. Roe, to guide in modernizing older types of a.c. motors and generators. Information covers problems encountered in redesigning and rebuilding windings, and in replacement or repair of burned-out or defective windings in present-day designs.

Chapters cover coil design, construction and insulation for both low and high-voltage service, advantages and limitations of older types of windings, properties and applications of recently perfected glass-fabric coil insulating materials, coil data forms and details; arrangement of conductors and leads; internal insulation; coil clearances; mush coils; shuttle-puller, involute, short-throw, and layer-wound pulled coils for closed-slot machines; data for building strap-copper coils. Other chapters cover ten or more major types or classes of windings, and discuss their effects when connections are changed or replacements are made. Price, $3, cloth-bound, 281 pages, 6" by 9" pages. McGraw-Hill Publishing Co., 330 W. 42nd St., New York.

Air Conditioning

Air conditioning is a study and reference book, incorporating the knowledge gained from over twenty-five years of engineering experience by the author. It removes the cloak of mystery enshrouding the science of air conditioning and presents thorough explanations in simple, understandable language.

Included in its discussions are: the correct method of calculating heat gain in an enclosure; how to choose air volumes properly; how to supply air to an enclosure; how to design the most efficient duct systems; how to choose the necessary air handling and refrigerating equipment; how to select dehumidifiers, either of the cooling coil or air washer type; when a direct expansion type system should be used in preference to a circulating water type system and vice versa; how ice may be used in air conditioning; a discussion of steam jet refrigeration; a discussion of water vapor refrigeration; a discussion of the use of chemical dehumidification in air conditioning; an explanation of well water systems; and a general outline of prevailing codes and regulations. Air Conditioning by Charles A. Fuller, M.E. Price $4.00. 576 (6 x 9) Pages, 300 Illustrations, including Charts, Diagrams, Floor Plans and Tables. Cloth Bound. Published by The Norman W. Henley Publishing Company, 2 West 45th Street, New York City.

MANUFACTURERS NEWS

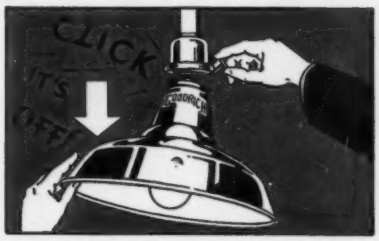
T. D. Cartledge, formerly assistant general sales manager, has been appointed general sales manager of the Linde Air Products Company of New York.

The Universal Motor Company of Oshkosh, Wis., has just announced the addition of E. G. Henderson to their export department.

Louis W. Agnew, formerly connected with the Franklin Electric Company, has joined the sales staff of Harry G. Anschuetz, of Philadelphia, district representative for Triangle Conduit & Cable Co., Inc.

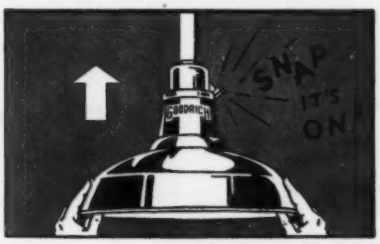
UMI

Off again . . . on again . . .
CLEAN AGAIN!



You needn't twist, tug or force. Simply lift the plunger to release reflector and lamp for cleaning.

To attach, press into hood. The spring-set plunger snaps into place; locks it securely before lamp will light.



DISKONECT REFLECTORS

● You know that you can't have good illumination with dirty reflectors. They must be cleaned occasionally.

We've simplified the service problem for you and your customers in the design of the *Diskonect*. You can remove reflector and lamp as a unit—in an instant, without fussing with tools or wiring. Even the socket is removable, so that the reflector can be immersed for thorough cleaning. Should socket be damaged, it can be replaced immediately at trifling cost.

EASIER TO INSTALL, *TOO!*

When you install Diskonect Reflectors, you have only to wire and attach the hoods which fit both medium and Mogul sockets. Reflectors, regardless of size, may be attached later.

Diskonect Reflectors are offered in a wide variety of sizes and styles, for all types of mounting. They're permanently finished in the best quality of porcelain enamel. An exclusive Goodrich product. Ask for full details.

Diskonect Reflectors and other Goodrich Lighting Fixtures are fully described in the Goodrich General Catalog. Electrical Contractors and Dealers are invited to write for it. Ask for Catalog No. 38.

MEMBER OF R. L. M. STANDARDS INSTITUTE

GOODRICH
ELECTRIC COMPANY

OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES & FACTORY: 2902 NORTH OAKLEY AVENUE, CHICAGO, ILLINOIS

UMI

GREENLEE
Inside-Wiring
TOOLS

Time and Money-Savers for the CONTRACTOR

Hydraulic Conduit Benders
Knockout Punches
Knockout Cutters
Cable Puller
Joist Borer
Electricians' Auger Bits
Bit Extensions
Hydraulic Pipe Pusher

Do You Have a Copy of Catalog No. 31E?

Our new catalog, No. 31E, illustrates and describes all the tools listed above, as well as others of interest. If you do not have a copy, send for one now.

GREENLEE TOOL CO.
ROCKFORD **ILLINOIS**

Greenlee Tool Co., Rockford, Illinois
Please send a copy of Catalog No. 31E.

Especially interested in .....
.....
Name .....
Street .....
City .....
State .....
My Jobber is .....E.C. 12-38

In the News

[FROM PAGE 50]

The Standard Transformer Company of Warren, Ohio, has appointed J. P. Voight, Summerville, S. C., as its representative in the states of North and South Carolina and Tennessee, east of a north and south line through the western corporate limits of Chattanooga.

Emerson Electric Manufacturing of St. Louis announces the appointment of W. Stuart Symington as president and general manager.

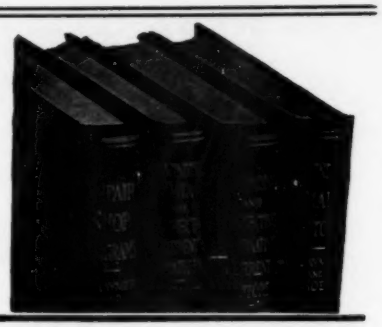
Robert S. Thurston, head of the sales engineering section of the General Electric air conditioning department for the past five years, has resigned his position to become general manager of the General Air Conditioning Co., G-E distributor in Memphis, Tenn.

Triangle Conduit & Cable Co. announces the appointment of Donald W. Droll as its representative in the states of Michigan, Ohio, West Virginia and Kentucky, east of Frankfort. Mr. Droll will make his headquarters in Detroit.

JOSEPH F. O'BRIEN LEAVES WESTINGHOUSE

J. F. O'Brien, long manager of sales promotion for Westinghouse Lamp Company and well known in the electrical industry since 1920, has resigned and joined the John B. Pierce Foundation in New York, as director of electrical research. The Pierce Foundation is devoted to educational and technical research and is engaged in developments in the electrical field. Mr. O'Brien's broad background on lighting and his recent activity in the planning of the Adequate Wiring Program promise interesting possibilities.

J. F. O'BRIEN



NOW- how to repair and rewind all types of motors . . .

ELECTRIC MOTOR REPAIR LIBRARY

4 volumes, $10.00, payable in easy monthly installments

THIS set of books should be on the shelf of every man who ever has to touch a motor for purposes of repairing it or changing it to meet different operating conditions. In shop language and with practical shop methods it covers every step in stripping, rewinding and connecting a.c. and d.c. motors of all kinds.

Do you know how to:

—lay out a wave winding
—test a.c. and d.c. motors to locate grounds, shorts, opens, quickly and positively
—properly record data when stripping armatures so that it will be instantly usable for correct rewinding by yourself or any experienced winder at any time afterward
—determine how many coils can safely be cut out
—lay out single-phase fan motor windings
—change single-phase windings for two- or three-phase operation
—make cross or equalizer connections on lap windings
—lay out frog-leg windings
—handle every step in a rewinding job from the time it comes into the shop until it leaves
—wind stators for tubogenerators
—band high-speed armatures
—rewind motors for voltage, speed, frequency, or cycle changes
—etc., etc., etc.

1,079 pages of practical shop methods and data on jobs like these in this library. A complete, modern key to repair of all motors. Nothing else in it; every page filled with definite, practical facts for the industrial maintenance man and the electric shop worker.

How to change motors for different operating conditions

Here is all the information you need in order to determine what changes various types of motors permit; to lay out new windings for specified service conditions; and to handle every step in the work with satisfactory results.

Covers all types of motors, from those used in small household and commercial appliances of all kinds, to mining and railway motors. Explains principles underlying the different types of winding; gives definite instructions for doing the various rewinding jobs. Also gives many data, tables and diagrams constantly needed by the repair man, including data difficult to get from any other sources.

Low price—easy terms—10 days' examination on approval

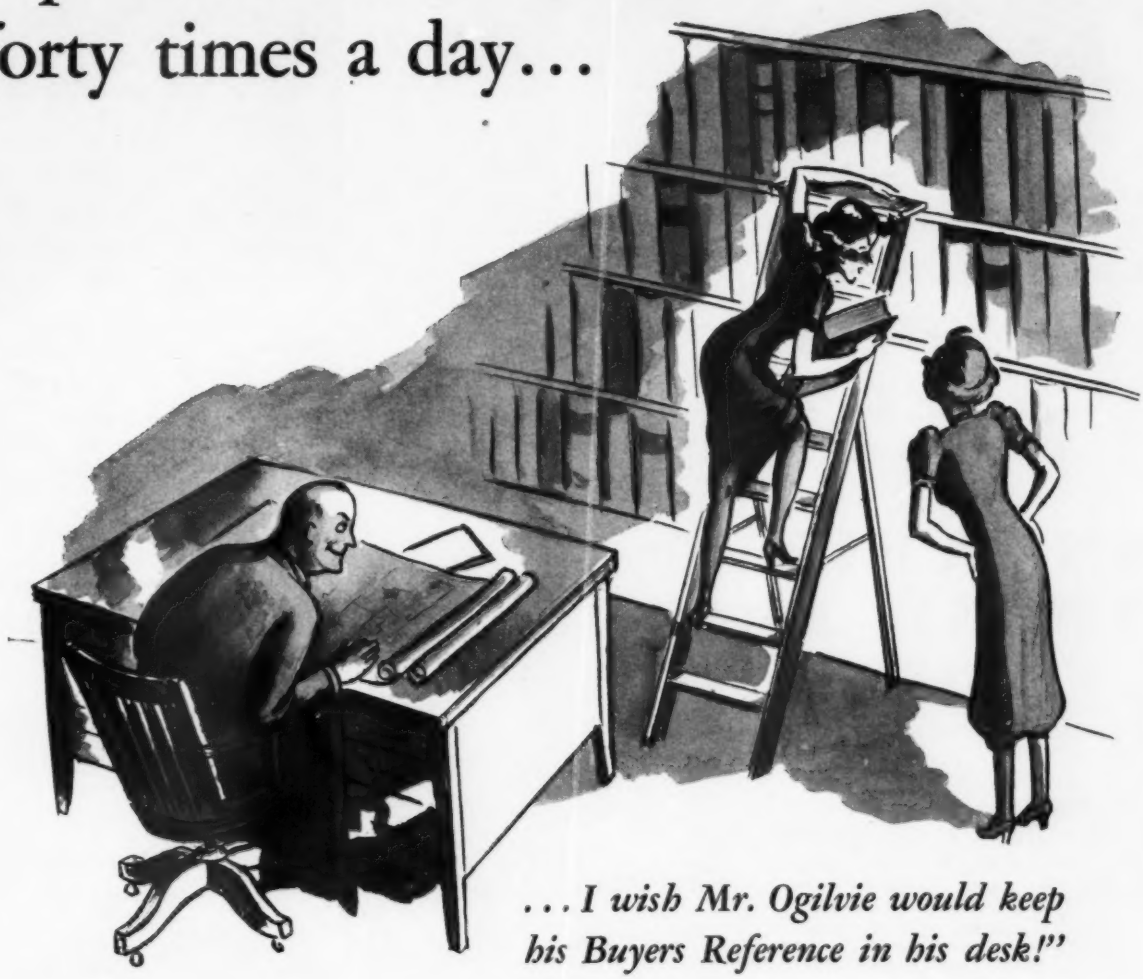
Bought separately the books in this Library would cost you $11. By using this coupon you need pay only $2.00 in 10 days and $2.00 monthly until the special price of $10.00 is paid. In addition, we give you 10 days in which to examine the books. Send no money; simply fill in and mail the coupon now; let us know your answer after you have seen the books.

McGraw-Hill Book Co., Inc.
330 W. 42nd St., N. Y. C.

Send Electric Motor Repair Library for 10 days' examination on approval. In 10 days I will send $2.00, plus few cents postage, and $2.00 monthly for four months, or return books postpaid. (We pay postage on orders accompanied by remittance of first installment.)

Name .....
Address .....
City and State .....
Position .....
Company ..... E.C. 12-38
(Books sent on approval in U.S. and Canada only.)

"*Up* and *down* this ladder forty times a day...



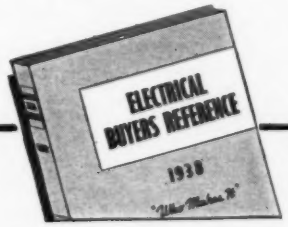
... I wish Mr. Ogilvie would keep his Buyers Reference in his desk!"

Sally is right. It *does* pay to keep the Buyers Reference at your elbow, where it can give you an immediate answer to questions about electrical products.

If you know only a trade name, you'll find the manufacturer in B.R.'s trade name index. Electrical and allied products are listed in the directory section, with names and addresses of manufacturers included. And a complete cross-reference index simplifies the whole job.

The Buyers Reference can save you time and money. Keep your copy within easy reach!

The Looking-Up-Place for Everything Electrical



ELECTRICAL BUYERS REFERENCE

ELECTRICAL CONTRACTING EDITION

A McGraw-Hill Publication ● 330 West 42nd Street, New York

UMI

MOTORS NEED THEM!

SHAWMUT THERM-A-TRIPS

(fuses with thermal cutout)

END NEEDLESS FUSE BLOWING BY WASHING MACHINES, REFRIGERATORS AND OTHER ELECTRICAL APPLIANCES.

The simplest, surest, and most economical protection for motors and motor circuits.

TWO TYPES:

REGULAR PLUG FUSE THERM-A-TRIP

Edison base, 125 volts. For motor protection, sizes from 0 to 14 amperes. For circuit protection, sizes from 15 to 30 amperes.

CARTRIDGE THERM-A-TRIP

250 volts. For motor protection, sizes 0 to 15 amperes.

The **CHASE-SHAWMUT COMPANY**

NEWBURYPORT MASSACHUSETTS

Fixture Renaissance

House demolition usually spells farewell to lighting fixtures of early vintage. In contrast, the recent tearing down of a Rockefeller house in Manhattan made quite a job for Herbert G. Martin, Inc., of Yonkers. A massive bronze chandelier with wall brackets to match is being completely overhauled for installation in a New York museum.

A/W COOPERATORS are J. Carl Baldridge, secretary of the Adequate Wiring Assn. of Idaho, and W. A. Hopper, of Gem State Electric Co., Boise, who heads the committee on apprentice training classes. They are just leaving Hopper's store for a conference on apprentice classes planned for southern Idaho this winter.

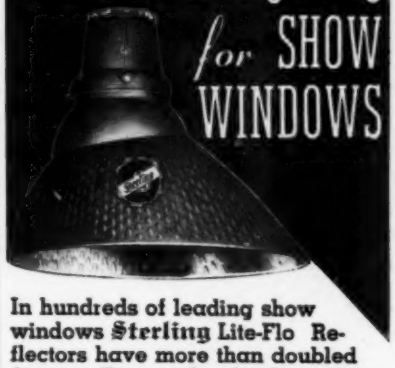
A Tough Customer

Just what can a contractor association do about keeping its name before its architects and engineers? The Detroit Electrical Contractors Association gives them a neat letter-size page of all the latest electrical symbols. If Detroit's knights of the T-square use symbols of the vintage appearing on some plans, then the association's stunt might be considered either a subtle gesture—or a nasty crack!

Machinists De Luxe

One of the most complete machine shops to be found in operation among electrical service shops is that of the Scranton (Pa.) Electrical Construction Company. Andrew Warnock, who has charge tells us this array of turret lathes, shapers, millers and gang drill presses fits in nicely for special jobs bordering on the electrical.

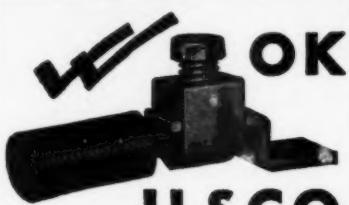
Controlled Lighting *for* SHOW WINDOWS



In hundreds of leading show windows Sterling Lite-Flo Reflectors have more than doubled foot-candles on the display using the same current — stepped up show window stopping power with no increase in operating cost. No wonder merchants are enthusiastic — no wonder contractors find Sterling Reflectors give the EXTRA VALUE that gets store wiring contracts.

Investigate Write for Catalog.

STERLING REFLECTOR CO
1135 W Hubbard St CHICAGO



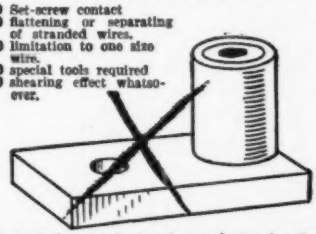
ILSCO

SOLDERLESS CONNECTOR

No Costly Castings or Forgings

ILSCO construction does not require the use of castings or forgings. That's one reason ILSCO Solderless Connectors are so economical to **buy** . . . their utter simplicity makes them equally economical to **use.** Other ILSCO features:

NO Set-screw contact
NO flattening or separating of stranded wires.
NO limitation to one size wire.
NO special tools required
NO shearing effect whatsoever.



NO need for you to search any longer for the PERFECT Solderless Connector . . . **WE HAVE IT!** Six Sizes Take Care of All Wires from No. 14 to 1,000,000 C.M.

FREE—A large display board bearing mounted samples of ILSCO lugs. Address Dept. EC

ILSCO COPPER TUBE & PRODUCTS, INC.
5629 Madison Road, Cincinnati, Ohio

Minnesota Law Shows Teeth

Licensed contractors violating the requirements of the State law and the National Electric Code in Minnesota are finding that the heat is on. Heavy fines have been levied and several Master's licenses have been revoked by the State Board, and others have been called before the Board for reprimands and warnings against further violations. Thousands of dollars worth of faulty work has also been condemned as a result of the State law, most of which has been made good by the offenders, and a number of defective jobs torn out and reinstalled by competent contractors.

Quick Sale

To Nat Eglowstein of Newark goes some sort of record for selling with a "gadget". Thirty minutes after he obtained a circuit breaker demonstration kit he sold a 16-circuit installation which involved $151 additional wiring. The sale was made in a doctor's residence-office, where the N. H. Eglowstein Co. had already done a $300 job during remodeling.

***INDUSTRY LEADERS** urged cooperation at the annual meeting of the Ohio Electrical Contractors Association in Cincinnati. Guests L. P. Dendel of Michigan's Electrical Administrative Board and H. C. Blackwell of the Cincinnati Gas & Electric Company congratulate President P. W. Schath on the fine spirit of the meeting.*

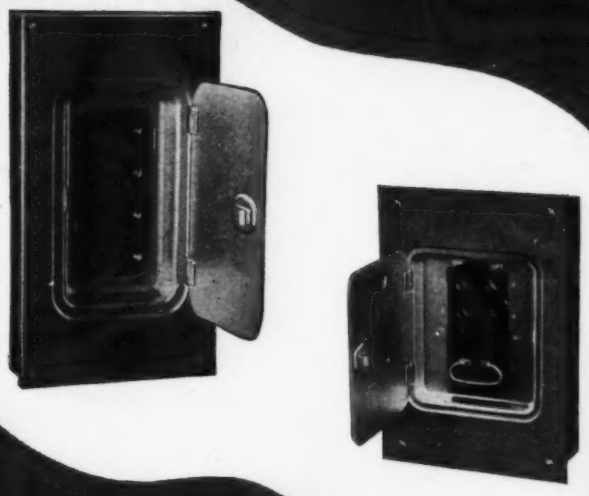
Testing Reward

J. J. Donohue of Worcester, Mass., recently crashed the gate of a nearby textile mill with his shiny new analyzer instrument outfit. A few quick readings showed some 7½ hp. motors pulling only 4 hp. because of changes made in belting. Now the Donohue Electric Co. is checking the mill's power factor, with all hands agreeable to abide by the recommendations of this modern minded industrial specialist.

Community Show Room

Contractors who operate from their homes sometimes pass up a good bet by failing to expand their own quarters properly. John Didwalis of Wilkes-Barre, Pa., built a nice store and shop on one end of a long lot, which extends to two streets, with the home facing on another street. His customers have a store handy for parking, away from crowded shopping areas.

Build your Prestige with PRESSED STEEL Fuse Panels



Every contractor is judged by the job he does—plus the grade of equipment he uses. You'll get more jobs by using Walker panels. Their entire front is one tough piece of pressed steel, entirely eliminating the possibility of breaking of spot welds and "bellying" of dead fronts as in ordinary fuse panels.

Apartment panels built for any number of circuits up to twelve. Resident types can include pull-out switches if specified.

Write for Full Information

WALKER
ELECTRICAL COMPANY
ATLANTA, GEORGIA

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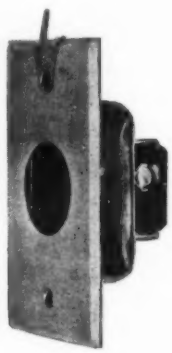
EQUIPMENT News

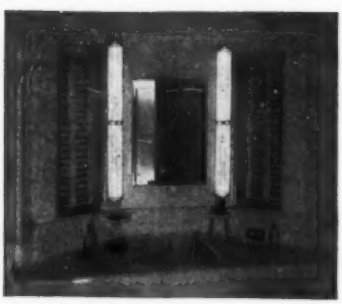
Electric Clock Hanger

A redesigned hanger and wall outlet for electric wall clocks which permits concealed wiring and connections. Consists of a brass receptacle with a recessed cup and hook to support the clock, together with a flush brass plate. Recessed cup accommodates two feet of cord and connecting plug. General Electric Co., Bridgeport, Conn.



G-E ELECTRIC CLOCK HANGER

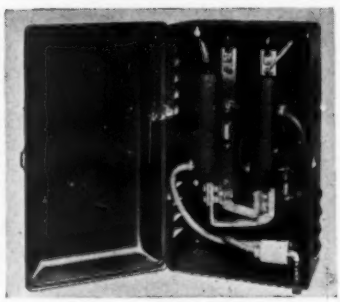
■



WAKEFIELD LUMILIER FIXTURE

Lumiline Fixture

A fixture designed for use with lumiline lamps combining molded plaskon with a semi-cylinder of opal glass. End caps of translucent plaskon glow with diffused light, making fixture luminous throughout. Available in two sizes, 14½ in. long and 20½ in. long. Measures four inches wide and can be applied to any flat surface. Available in pastel green, ivory, coral or blue plaskon. The F. W. Wakefield Brass Co., Vermillion, Ohio.



WESTINGHOUSE WELD-O-TROL

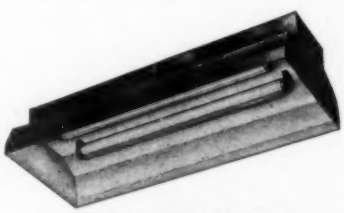
Welding Contactor

A new "Weld-o-trol" electronic power switch for controlling the primary of welding transformers and for use with existing timing devices. Offers an instantaneous power switch for producing uniform welds and is free of moving parts, arcing contacts and noise. Available ratings are roughly equivalent to 300 and 600 ampere conventional welding contactors. Consists of a sheet metal cabinet containing a bus bar assembly, electrical connections and a flow switch. Electrical connections are one power cable entering the unit and one leaving the unit and two control leads from the timer. No added control voltage is required Westinghouse Electric & Mfg. Co. East Pittsburgh, Pa.

■

Fluorescent Inspection Unit

First of a line of fixtures for fluorescent mazda tubes. Inspection units to mount one, two or three tubes. Built of steel, finished in sprayed paint enamel or porcelain enamel, white inside, black outside. 15 and 20 watt lamps operate on 110-120 volts, 30 watt lamps on 220-240 volts a.c. Units include auxiliary transformer. Fixture loops for chain suspension, mounting flanges for ½ in. pipe. Wheeler Reflector Co., 275 Congress Street, Boston, Mass.



WHEELER FLUORESCENT UNIT

HOLOPHANE IN-BUILT LIGHT

In-Built Lighting

Simple unit embodying prismatic reflector and refractor, designed for recessing in the plaster of a false ceiling. The plaster ring is set and the unit bolted in position. Connected by flexible wiring to an outlet box. Sizes from 100 to 300 watt lamps. Fits any type of ceiling. Complete assembly includes fitters and rings. Specially suited for low ceiling construction. Holophane Company, 342 Madison Ave., New York.

■

Daytube Industrial Units

Litecontrol Daytube units for use with fluorescent mazda lamps. An industrial type with open ends, a standard type with closed ends, each made in six sizes for various combinations of lamps, both constructed of heavy steel with high efficiency reflecting surfaces. Jack chain suspension or rigid hanger with adjustable joint. Litecontrol Corporation, 27 Haymarket Square, Boston, Mass.

LITECONTROL DAYTUBE UNIT

■

Conduit Finish

A new conduit finish known as Walkerizing, for protecting steel conduit from corrosion. A uniform coating of zinc is fused into outside and inside walls of steel tube. Over this is applied a second coating containing a new, inert substance, which offers strong resistance to acids, alkalis and salt water. It may be used where chemical conditions create serious corrosion problems, and claims longer service in all types of installations. Walker Brothers, Conshohocken, Pa.

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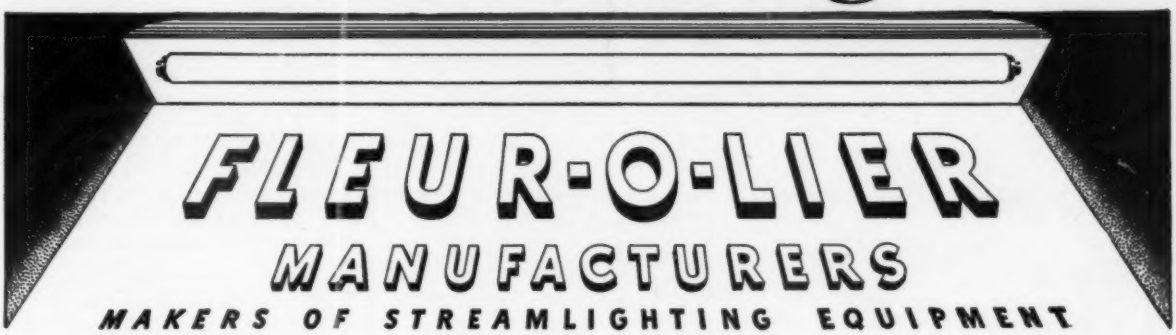
HISTORY MAKING NEWS ABOUT REVOLUTIONARY NEW FLUORESCENT LIGHTING

Announcing



FLEUR-O-LIER
MANUFACTURERS
MAKERS OF STREAMLIGHTING EQUIPMENT

FLEUR-O-LIER is the name of a new product and the mark of a new service.

A Fleur-o-lier is a Lighting Fixture, in which a Fluorescent MAZDA lamp is employed as the light source, and in which all operating apparatus, component parts and materials, used in manufacture, fabrication and assembly, are first specified, then checked either by blueprint, drawing or samples, and when approved, are certified by Electrical Testing Laboratories to comply with specifications set up for fixtures using Fluorescent MAZDA Lamps.

A Problem Solved in the American Way

Fluorescent Streamlighting presented a new problem. It has been approached in the American Way . . . by mutual cooperation of competing manufacturers. The revolutionary new light sources had no chandeliers . . . no fixtures. Existing equipment would not do. So the "Fleur-o-lier Manufacturers" was organized to establish specifications and maintain the highest standards of manufacture for new chandeliers, lighting fixtures and operating equipment for this new kind of lighting and thus render the buyers satisfactory service from the start.

Specifications designed to secure immediate satisfactory performance, were set up in cooperation with the following manufacturers:

GENERAL ELECTRIC CO.
WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
Makers of Fluorescent Mazda Lamps

Also the makers of auxiliaries, sockets, and other necessary equipment.

Consumer Confidence Assured from the Start

"Seal of Certification" of Electrical Testing Laboratories will be affixed to each Fleur-o-lier and auxiliary.

"The MAZDA Lamp Manufacturers guarantee the performance of Fluorescent MAZDA Lamps only when used with an auxiliary equipment bearing this label." *(Quoted from Seal of Certification)*

Jumped ahead three years by this program

Through this definite, cooperative program, Fleur-o-lier Manufacturers are now essentially three years ahead in ability to give immediate and satisfactory service with this new product.

All vital knowledge gained through research and out of the pooled experience of the associated groups is made available to each member manufacturer, so that he has the information he needs at the start.

As new improvements, additions, and refinements in tubes, and new refinements, improvements or changes in dimensions of auxiliaries are brought forward, frequent bulletin service will notify member manufacturers, so that they will always be in possession of the latest word in the art.

Cooperation for Better Service and Bigger Markets

In Electrical Testing Laboratories, each Fleur-o-lier Manufacturer has the inspection service of a testing organization, recognized as the oldest and finest in the field of lighting, to help him maintain the quality of his product.

In the cooperative advertising of the Fleur-o-lier Manufacturers, and in the advertising of the Fluorescent MAZDA Lamp advertisers, he has the benefits of a nation-wide campaign to build rapid consumer acceptance, and open up the vast new market for this new kind of lighting. A list of Fleur-o-lier Manufacturers will be sent in reply to all inquiries received from advertising.

It is obvious that this plan of specification, inspection, test and certification serves the best interest of all concerned. It insures satisfactory performance to the user and speeds consumer acceptance for dealer, distributor and manufacturer.

All who are interested in STREAMLIGHTING are requested to write for further information and a list of FLEUR-O-LIER member manufacturers.

IMPORTANT TO MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT:
If you are not already affiliated with this group, write for full details.

FLEUR-O-LIER MANUFACTURERS
2121 Keith Building • Cleveland, Ohio

Interest in the use of Fluorescent MAZDA Lamps is growing by leaps and bounds as people begin to explore their astonishing possibilities from the standpoint of daylight lighting and color. Manufacturers can easily see that this promises to add vast new opportunities for unheard of sales volume.

The Manufacturer guarantees by affixing this Label that this Fluorescent Lamp Auxiliary is a replica of the samples subjected to periodic tests and inspections by
ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

"Seals of Certification"

COUPON

FLEUR-O-LIER MANUFACTURERS, 2121 Keith Building, Cleveland, Ohio

Gentlemen: Please send me further information covering the subject checked: ☐ Streamlighting and Streamlighting Equipment. ☐ Membership in Fleur-O-Lier Manufacturers.

Name _____

Address _____

City _____ State _____

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So you want to **increase your profit margin . . .**

And Still Make More Money On *Every Wiring Job!*

So you want to increase your profit margin—and make more money on every wiring job? . . . then you will want to follow the example of other successful contractors and standardize on the use of Knobs & Tubes . . . For Knob & Tube wiring is not only the favored type of wiring among inspectors who *know*, but it is also faster, simpler, easier for contractors to handle. Offer your customers the better wiring . . . especially, since it can *make more money* for *you*.

Your electrical wholesaler carries a full line of PORCELAIN PRODUCTS for every requirement of all porcelain wiring jobs. Write us direct for descriptive literature. Start TODAY to increase your profit margin and *make more money* on every wiring job!

PORCELAIN PRODUCTS, INC.

FINDLAY, OHIO
PARKERSBURG, W. VA.

EQUIPMENT News

[FROM PAGE 56]

Wiring Channel

A line of wiring channel for handling all types of fluorescent lighting installations. Suitable for general store lighting, industrial lighting over work benches, cove and dome lighting, luminous panels, display case lighting. Individual channel covers provide holes for attaching reactance. Available in standard lengths for use with 18-in. 24-in. and 36-in. lamps without cutting or drilling. Channel covers in chromium plate, aluminum, bronze, white enamel. Wilson Lighting, Inc., 411 So. Clinton St., Chicago, Ill.

WILSON FLUORESCENT WIRING CHANNEL

■

Floodlight

A new S & M No. 1052 CA floodlight, called Red Cap. Finished in alzak and available in both specular and diffused surfaces with beam spreads ranging from 15 to 100 degrees. Bracket assembly and wiring provisions are of new design, providing easy, simplified installation. Can be furnished with heat resisting lenses, clear-plain, 30 deg. spread or diffusing; glare shields and spill light reflectors. S & M Lamp Co., 119 West 36th Place, Los Angeles, California.

S & M RED CAP FLOODLIGHT

■

Thermal Plug Fuse

A new Trico-Matic thermal time-lag fuse. Holds starting and momentary overloads and gives protection on prolonged overloads, making overfusing unnecessary. Can be used in place of ordinary fuses on circuits having motor driven machinery or appliances, such as refrigerators, oil burn-

Now!

INCREASE YOUR **INDUSTRIAL INSTALLATIONS**

Specially Designed **MULTI** *diffusing Reflector for Silver Bottom Lamp . . . .*

Now you can show your prospects how they can get maximum benefit from the Silver Bottom Lamp. The MULTI Diffusing Reflector is the modern answer. 1. It permits ventilation—important because these lamps run hotter than the standard Mazda. 2. Top opening permits a portion of light to escape to the ceiling.

Write for catalog—it will give you details and it's important for you to know about this Reflector.

MULTI ELECTRICAL MANUFACTURING CO.
1840 W. 14th St. Chicago, Ill.

Don't Let Us Just **WISH** *You A Prosperous New Year*

Let Us Help You ***MAKE*** *It One with*

"AUTOMATIC"
Time Switches
Interval Timers
Flashers

Write for Information and Discounts

AUTOMATIC ELECTRIC MFG. CO.
MANKATO, MINNESOTA

ers, stokers, washers, mangles, pumps. Some of its features are—color indicator for all popular sizes; all-porcelain shock and vent-proof top; flag indicator when blown; large ampere rating on window; flat releasing spring under copper link to giving maximum travel in opening arc; arc-confining disc. Trico Fuse Mfg. Co., 5th Street at Chambers, Milwaukee, Wis.

TRICO PLUG FUSE

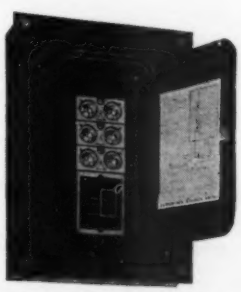
Inter-Phones

New wall type handset inter-phones of modern streamline design. Case is molded black phenol compound, which is mar-resisting. Receiver transmitter unit is assembled in compact handle. Duratex cord is long enough to allow free use of handset. Graybar Electric Company, 420 Lexington Avenue, New York.

GRAYBAR INTER-PHONE

Main Switch

New line of main service equipment—the 64,300 series, having 30 amp. main switch and from 2 to 8 branch circuits—the 66,200 series with 60 amp main switch and branch circuits from 2 to 12 incl. Switch heads of bakelite, more knockouts, snap-in gutter cover which dispenses with holding screw on items having 4 branch circuits and less. Solderless wiring terminals. Will accommodate non-tamperable fuses. BullDog Electric Products Co., 7610 Jos. Campau Ave., Detroit, Mich.



BULL DOG MAIN SWITCH

New SCHOOL SOUND SYSTEMS BREAKING ALL SALES Records!

Let Webster-Chicago help you Cash in on these BIG UNIT Sales

Model S-40
for any number of rooms to 40 . . .

Model S-40 . . . a sectionalized system with two channel features completely installed in attractive metal cabinet. Highest quality custom built refinements. Can be purchased for schools of 10 rooms or less and added to as building or budget requirements necessitate. Maximum capacity—40 rooms.

2 SYSTEMS SECTIONALIZED ANSWER ALL REQUIREMENTS

Model RP-100
for unlimited number of rooms

Model RP-100 . . . a custom built system having a basic flexible design permitting such personal selection as:

- **Any Number of Rooms**
- **Multiple Channel Service**
- **Any Number of Program Originating Points**
- **Automatic Record-changing Equipment**
- **Tone Equalization for Unusual Acoustical Conditions**

● Are you going to share in the profits of school installations? Don't let the fact that they run into big figure; stop you. As designed by Webster-Chicago, installation of either system is relatively very simple and satisfactory performance is assured from our 15 years' experience. Beautiful 2-color literature available for mail work or direct solicitation. Ask your jobber or write for more information.

COMPLETE SPECIFICATIONS AVAILABLE FOR MAILING TO SCHOOL ARCHITECTS

WEBSTER-CHICAGO
5622 Bloomingdale Ave., Chicago, Illinois

Manufactured under license arrangements with Electrical Research Products, Inc., subsidiary of Western Electric Co., Inc., and American Telephone and Telegraph Co.

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EVERY DAY—
IN MANY WAYS
these

PAINE
1912 ANCHORS HANGERS 1939
Superior Feature
BUILDERS SPECIALTIES

Come to the Rescue

Are you doing business without the Paine catalog? It shows ways to make savings and short cuts by the dozens. You really ought to have it . . . and you can—merely by requesting a free copy.

PAINE PERFORATED METAL STRAP

Fig. 500

Fig. 500A

ANY METAL
ANY FINISH
ANY WIDTH
ANY GAUGE

Here's a mighty handy item for the electrician, often used for such work as making grounds and hanging conduit. It's very low in cost, takes up but little space and is easy to use. All perforations are accurate. Edges rounded without burr.

COILS Handiest for stocking and slips in any corner of the workman's kit. Each coil is ten feet in length.

STRAIGHT STRIPS In 5 ft. and 10 ft. lengths —100 ft. to the bundle. If you require it made to special specifications, we'll supply it promptly and economically.

PAINE "SNUGFIT" CONDUIT HOOK

Its prominent bead makes it easy to drive the spike. "SNUGFIT" fits snugly around a greater part of the conduit circumference. This specially developed feature serves to keep the conduit in the desired position. Supplied in lengths up to ten inches and up to 2 inches in diameter. You'll like them.

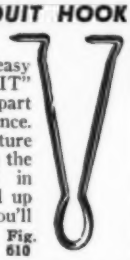


Fig. 610

GET THE PAINE CATALOG

It's a regular textbook of hanging and anchoring specialties developed through more than a quarter of a century of close cooperation with the Industry.

THE PAINE COMPANY

Main office and factory: Dept. 58C —2949 Carroll Ave., CHICAGO. Eastern office: 48 Warren St., NEW YORK.

EQUIPMENT News

[FROM PAGE 59]

Reflector

A new Lite-Flo reflector developed for more efficient illumination of low, medium, or deep show windows where merchandise is trimmed high. Round, 7-in. diameter bottom opening facilitates flush mounting. No. 704, uses standard 100 watt A-23 lamps. Furnished complete with holder. Sterling Reflector Co., 1431 W. Hubbard St., Chicago, Ill.

STERLING LITE-FLO REFLECTOR

■

Ray Insect Killer

A new electric ray insect killer, called Leray, employs the penetrating sections of an infra-red ray generated by a specially designed light bulb and filament. The bulb, housed in a cone-shaped container of spun steel, sheds a brilliant spot of light which quickly kills insects. Can be directed on plants, animals and cloth without damage. Measures 11½ in. long, 6½ in. in diameter and comes equipped with an 18-in. cord. Operates on a.c. or d.c. LeRay Corporation, New York City.

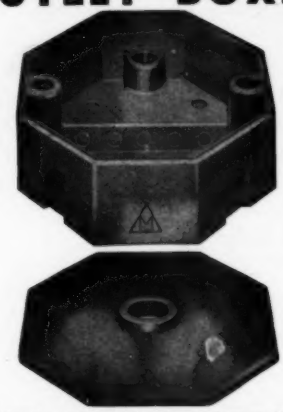
LERAY INSECT KILLER

■

Medium-Spread Floodlight

A new medium-spread type floodlight made of Alzak aluminum for sports areas, service stations, yards, construction areas and other outdoor locations. Designed for use with 750, 1,000 or 1,500 watt lamps. Delivers a symmetrical beam with a spread of approximately 65 deg. Weather-proof construction with reflecting surface treated by the Alzak process. Mounting brackets available for cross arm mounting, clamping to pipe, or slip-fitter for 1½ to 2 inch

Profit by USING
ILLINOIS
Dependable Porcelain
OUTLET BOXES



★Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency.

Contractors who use these products not only establish themselves most securely with their customers but also build their business by making each job a true quality one. Send for bulletin.

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILL.

A SCREW DRIVER
and
a

TWIST

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THE RATTAN MANUFACTURING CO.
522 STATE STREET
NEW HAVEN, CONN., U. S. A.
GENERAL SALES AGENTS HATHEWAY AND CO.
220 CHURCH STREET NEW YORK, N. Y., U. S. A.

iron pipe mast. Heat resisting glass covers are available where required. Available with bi-post lamp holders as well as standard mogul sockets. Benjamin Electric Mfg. Co., Des Plaines, Ill.

BENJAMIN ALZO-LITE FLOODLIGHT

■

Lumiline Lamp Holder

End cap lampholders for lumiline lamps with a built-in switch to provide individual control of bracket fixtures. A deep collar and smooth action rotary switch. Rated at 660 watt, 250 volts. Available in black and white. The Bryant Electric Co., Bridgeport, Conn.

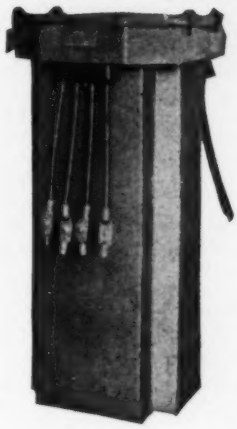
BRYANT LUMILINE LAMPHOLDER

■

Time Switch

A new line of time switches known as Paragon 300 Series. Consists of back and forth snap-action tripping lever, activated by trippers on clear-line dial. Can be manually operated by touch of a finger tip, without changing automatic switching sequence. Rated capacity 3000 watts per pole. Paragon Electric Company, 37 West Van Buren St., Chicago, Ill.

PARAGON TIME SWITCH



Transformers for Today's Requirements

Glance at the list of important design features of AmerTran Type "RS" Distribution Transformers—see below—and you will see that these units possess many refinements which minimize the danger of damage due to usual causes, such as momentary short circuit, lightning surges, overloads of short duration, rough handling, exposure and severe usage. Further, you will note that they are made so that in the event of damage they can be repaired quickly, easily and inexpensively. These features help reduce operating expenses. May we send you Catalog 116 which contains complete data?

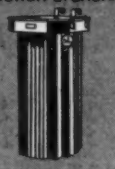
Type "RS" Design Features

1. May be completely dismantled and reassembled with a wrench.
2. Bushings of coordinated flashover type — quickly replaced (no soldering) yet incapable of syphoning oil.
3. External parts rust resistant — tanks of copper bearing steel; covers cast from nickel-iron alloy.
4. Patented clamps permit removal of coil after end iron only has been taken out.
5. All units are of similar electrical and mechanical design in sizes from 1½ to 100 Kva. and for potentials up to 8,000 Volts.
6. Coils of fully balanced design and with ample ventilating ducts are vacuum impregnated in varnish.
7. Rigid core construction prevents damage due to momentary short circuit or rough handling.
8. All units are shipped filled with oil so as to reduce your transportation and installation expense.
9. Design offers high turn-to-turn insulation and optimum impedance characteristic.
10. Optional feature—lightning protection by Crystal Valve lightning arresters and grounding gaps.

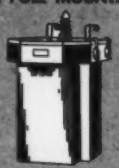
AMERICAN TRANSFORMER CO.
178 Emmet St., Newark, N. J.

AMERTRAN

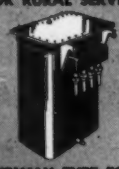
AMERTRAN
Distribution Transformers



CONVENTIONAL TYPE FOR POLE MOUNTING

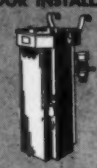


SINGLE-BUSHING TYPE FOR RURAL SERVICE



SUBWAY TYPE FOR SUBMERSIBLE SERVICE

FIREPROOF TYPE FOR INDOOR INSTALLATION



SURGE-PROTECTED TYPE WITH LIGHTNING ARRESTERS

VAULT TYPE WITH JUNCTION BOXES

CONVENTIONAL TYPE FOR OUTDOOR MOUNTING

UNITS WITH EXTRA FEATURES FOR SPECIAL NEEDS

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SORGEL
AIR-COOLED
Transformers

Step Up Efficiency

by Supplying 110 Volts

for lighting, portable tools, heating devices, appliances

from 220, 440 or 550 Volt A.C. power circuits

Other voltages can be obtained from one service, by using SORGEL Air-Cooled Transformers.

The Air-Cooled feature in SORGEL Transformers assures easy and economical installation in any convenient place inside of buildings, or right where the change of voltage is wanted. No enclosures or fire-proof vaults needed. No oil. No upkeep. Approved by Underwriters.

Stock sizes ¼ to 50 Kv-a.

Larger sizes and special types built to order quickly

Write for literature with diagrams and prices

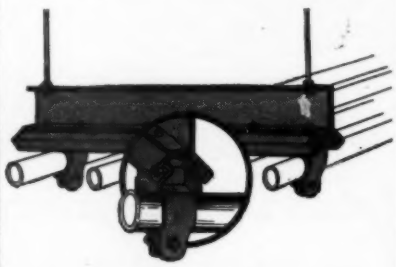
SORGEL ELECTRIC CO.
No. Plankinton Avenue Milwaukee, Wis.

EQUIPMENT News

[FROM PAGE 61]

Conduit Hanger

A conduit hanger consisting of rails that are fastened directly to, or hung from, concrete, wood or steel beams, unto which as many individual holders can be slipped as are required. Accommodates conduits from ½-in. to 4-in. in any sequence. Can be used horizontally, vertically or at any angle. Conduits can be replaced or added at any time. Tightening one screw binds conduits and hanger in desired position. The Cleveland Switchboard Company, 2927 East 79th Street, Cleveland, Ohio.



CLEVELAND CONDUIT HANGER

■

Reflectors

A line of enameled metal reflectors for industrial lighting. Drawn from heavy guage steel and enameled white inside, green outside. Made with deep skirt to eliminate glare, in shallow dome for wide distribution, deep bowl for concentrated lighting and in five angle types for aisles, windows, signs, playgrounds. Sizes run from 10 to 16 inches. Long necked types can provide a twist lock. Short necks come complete with socket, that fits into outlet box opening and requires no fixture. Syntron Company, Homer City, Pa.

SYNTRON REFLECTOR

■

Multi-Breaker

New multi-breaker combination known as Type MBM to facilitate wiring and conserve space, when it is necessary to meter a range or water heater separately from the other circuits in a home. Besides providing for lighting and device circuits, the enclosure gives space for a

BURNDY

SCRULUG

The one-piece lug that cannot fall apart. Low in cost, high in strength and quickly installed with pliers or screwdriver . . .

FREE a sample Scrulug on request; mention wire size

BURNDY Engineering Company, Inc. 459 E. 133 Street N. Y. C.

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3 speeds • Automatic Operation • Super-powered Motor

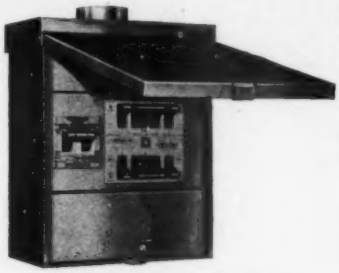
VICTOR In-Bilt VENTILATORS

More sales features, greater beauty, better construction, and easier installation—that's what you get in a Victor electric kitchen ventilator. Three models for your selection—for large homes, small homes and for low-cost or speculative type building. Send for new ventilation data book, which shows complete Victor line and gives detailed specifications, prices, and discounts, today!

VICTOR ELECTRIC PRODUCTS, INC.
809 Reading Road Cincinnati, Ohio

Free Data Book
Write for Yours Now

Type M double pole multi-breaker unit, which is not connected to the other circuits and may be wired directly to another meter without changing wiring within the box. Circuit capacities are 15, 20, 25, 35 and 50 ampere, 115 and 115/230 volts a.c. Square D Company, 6060 Rivard St., Detroit, Mich.



SQUARE D MULTI-BREAKER

■

Stock Reflector

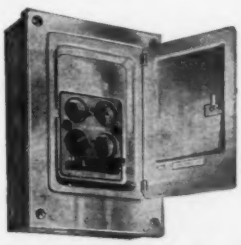
A Quad aisle-stock reflector designed for use in warehouses, stock rooms for illuminating shelving and bins. Reflects wide spread of light downward and outward to each side of aisle. Eye shielding is obtained by lower light cut-off angle at each end of reflector. Four interchangeable styles of QD socket fittings, including new Type T feed-thru fitting. Quadrangle Mfg. Co., 30 S. Peoria St., Chicago, Ill.

QUADRANGLE STOCK REFLECTOR

■

Fuseless Main Switch

A new line of fuseless main switches that provide up to 6 branch circuits. Furnished in both long and short cabinets. Long cabinets provide space for both transformer and Despard type switches. Surface and flush type cabinets have plastic adjustment, 30 ampere, 120-250 volts with solid neutral. Front operated rotor disc switches. Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.



COLT-NOARK FUSELESS MAIN SWITCH

INSTALL

ROME-60

Tough — long wearing — heavy duty

60% jacketed

PORTABLE CORDS

WELDING CABLES

MINING MACHINE CABLES

Designed for maximum flexibility, to resist fracture due to twisting, and with strength to withstand sharp jerks and pulls under torsion.

Send for samples.

ROME CABLE CORP.

ROME, N.Y.

PRODUCTS

Hot rolled rods, bare and tinned copper wire, bare and tinned strand, U.R.C. weatherproof wire, cotton, paper and asbestos magnet wire, rubber insulated wires and cords, lead covered cables.

SALES OFFICES

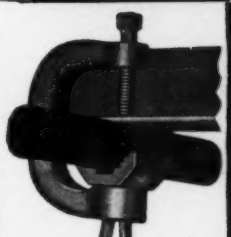
New York, Chicago, Philadelphia, Pittsburgh, Richmond, Cleveland, Boston, Los Angeles.

FLOOR BOXES and WIRING SPECIALTIES

LATROBE

No. 330 "LATROBE" TOM THUMB UTILITY OUTLET

For use in wood installations, and other locations free from moisture or mechanical injury.



No. 470 PIPE OR CONDUIT HANGER

Pipe support can be turned freely, permitting pipe to run parallel, or at right angles to beam. Eliminates drilling or use of straps. Will accommodate sizes of ½", ¾" and 1" pipe to steel beams ⅝" thick.

Sell and install LATROBE—the complete line for residential, commercial and industrial work.

Catalog on request

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LATROBE · PENN.

No. 285 DOUBLE DUPLEX RECEPTACLE NOZZLE

The most attractive, compact and easy-to-install fitting on the market. Shown in illustration with No. 200 Cover Plate.

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Write for further details and appointment.

J. A. SULLIVAN
Sales Manager

As Easy as ABC *you get*

Instant
Accurate
A.C. or D.C.
Current
Measurements

up to 800 amperes without breaking the circuit or interrupting service.

With the Tong Test, wiring surveys are quickly and easily made. It will pay for itself in almost no time by the amount of new rewiring business it will bring you—plus the time and money it saves in checking motors, transformers, etc.

Write for your copy of the bulletin describing both the Tong Test and the Voltor, a voltage-measuring attachment for the Tong Test.

COLUMBIA ELECTRIC MFG. CO.
4501 Hamilton Ave. Cleveland, Ohio

TONG TEST AMMETERS

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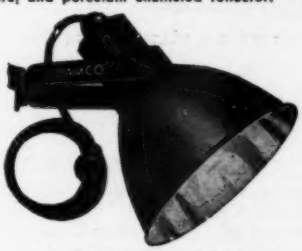
* See 1937-1938 Buyers' Reference number of Electrical Contracting for additional information on these companies and their products.

OAMCO REFLECTORS

GET MORE RURAL LIGHTING BUSINESS

No. 1168—wired
No. 1195—not wired

Listed by Underwriters' Laboratories, Inc. Packed one in a carton. Consists of ½" conduit, wall flange, porcelain socket, lag screws, wire, and porcelain enameled reflector.



No. 1139 Handy Floodlight
Outdoor or indoor use. Adjustable bracket. Porcelain enameled reflector.

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411 S. Clinton St. Chicago, Ill.

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PRICE, QUALITY AND SERVICE ON STANDARD
ELECTRICAL SUPPLIES
Devices and Appliances
Lamps and Lighting
WHOLESALE SUPPLIERS
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